DOCUMENT RESUME

ED 165 609 HE 010 867

TITLE	Occupational Outlook for College Graduates, 1978-79 Edition. Bulletin 1956.
INSTITUTION	Bureau of Labor Statistics (DOL), Washington, D.C.
PUB DATE	78
NOTE	272p.; The assessment of employment outlook for college graduates was prepared by Daniel F. Hecker ; Some photographs will not reproduce clearly
AVAILABLE FROM	U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C. 20212
EDRS PRICE	MF-$0.83 HC-$14.05 Plus Postage.
DESCRIPTORS	*Career Opportunities; *College Graduates; *Employment Projections; Employment Qualifications; Employment Trends; *Higher Education; *Job Market; Labor Supply; *Occupational Information; Occupational Mobility; Resource Guides; Salaries; Trend Analysis; Work Environment
IDENTIFIERS	*Job Descriptions

ABSTRACT

This guide to career opportunities in over 100 fields covers a broad range of occupations for which a college degree is, or is becoming, the usual background for employment. For each occupation, information is presented on the nature of the work; places of employment; education, skills, and abilities required for entry; employment outlook; earnings; and working conditions. Information is also presented on how to use the guide, where to go for more information, assumptions and methods used in preparing employment projections, and important occupational and industrial employment trends. Occupations covered include workers in professional and related occupations, sales occupations, managerial and administrative occupations, and service occupations. The section on places of employment provides information on the number of workers in an occupation and tells whether they are concentrated in certain industries or geographic areas. The section on training, other qualifications, and advancement tells the minimum level and type of education required for various occupations and in many cases lists alternative ways of obtaining training. Frequently observed patterns of moving from one occupation to another are also discussed. For some occupations, information is provided on prospective job opportunities in terms of the expected demand-supply relationship. For every occupation and industry, an estimate of future employment needs is developed. (SW)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

Occupational Outlook for College Graduates, 1978-79 Edition

ED165609

U.S. Department of Labor
Ray Marshall, Secretary

Bureau of Labor Statistics
Julius Shiskin, Commissioner
1978

Bulletin 1956

Material in this publication is in the public domain and may be reproduced without permission of the Federal Government. Please credit the Bureau of Labor Statistics and cite the name and number of this publication.

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

HE 010 867

Preface

Career planning has become increasingly important to college graduates who seek a rewarding career. For the past 6 or 7 years, the number of college graduates entering the labor force has exceeded the number of job openings in the kinds of jobs usually sought by graduates. As a result, college graduates, as a group, have faced competition for the jobs they wanted. However, graduates prepared to enter some occupations have fared much better than those prepared to enter others. At least through 1985, this competition for jobs is likely to continue. Graduates least well prepared for the job market will probably continue to face difficulties finding the kinds of jobs they want.

The *Occupational Outlook for College Graduates* is a guide to career opportunities in a broad range of occupations for which a college degree is, or is becoming, the usual background for employment. It contains a brief summary of the expected changes in the economy, in addition to an analysis of the overall supply and demand situation for college graduates through the mid–1980's. Each occupational statement presents information on the nature of the work; places of employment; education, skills, and abilities required for entry; employment outlook; earnings; and working conditions.

The assessment of employment outlook for college graduates was prepared by Daniel E. Hecker, Division of Occupational Outlook.

Contents

Page

I. How to use this book ... 1
II. Where to go for more information ... 7
III. Assumptions and methods used in preparing employment projections ... 15
IV. Tomorrow's jobs for college graduates ... 19
V. Occupations ... 29
  Accountants ... 29
  Actors and actresses ... 31
  Actuaries ... 34
  Advertising workers ... 36
  Air traffic controllers ... 38
  Airplane pilots ... 40
  Anthropologists ... 43
  Architects ... 44
  Astronomers ... 47
  Bank officers and managers ... 48
  Biochemists ... 50
  Blue-collar worker supervisors ... 51
  Broadcast technicians ... 53
  Buyers ... 54
  Chemists ... 56
  Chiropractors ... 59
  City managers ... 60
  Claim representatives ... 62
  Clergy ... 64
    Protestant ministers ... 65
    Rabbis ... 66
    Roman Catholic priests ... 68
  College student personnel workers ... 70
  Commercial artists ... 72
  Cooperative extension service workers ... 74
  Counselors ... 75
    School counselors ... 76
    Employment counselors ... 77
    Rehabilitation counselors ... 79
    College career planning and placement counselors ... 81
  Credit managers ... 83
  Dancers ... 85
  Dental hygienists ... 86
  Dentists ... 88
  Dietitians ... 90
  Drafters ... 92
  Economists ... 93
  Engineering and science technicians ... 96
  Engineers ... 100
    Aerospace ... 103
    Agricultural ... 104
    Biomedical ... 104

Page

    Ceramic ... 105
    Chemical ... 106
    Civil ... 106
    Electrical ... 108
    Industrial ... 108
    Mechanical ... 109
    Metallurgical ... 110
    Mining ... 111
    Petroleum ... 112
  FBI special agents ... 113
  Flight attendants ... 114
  Food scientists ... 115
  Foresters ... 117
  Geographers ... 119
  Geologists ... 121
  Geophysicists ... 123
  Health and regulatory inspectors (Government) ... 125
  Health services administrators ... 129
  Historians ... 131
  Home economists ... 133
  Hotel managers and assistants ... 135
  Industrial designers ... 135
  Industrial traffic managers ... 137
  Insurance agents and brokers ... 139
  Interior designers ... 141
  Interpreters ... 143
  Landscape architects ... 145
  Lawyers ... 147
  Librarians ... 150
  Life scientists ... 153
  Manufacturers sales workers ... 156
  Marketing research workers ... 157
  Mathematicians ... 159
  Medical laboratory workers ... 161
  Medical record administrators ... 164
  Merchant marine officers ... 165
  Meteorologists ... 169
  Musicians ... 171
  Newspaper reporters ... 173
  Occupational therapists ... 175
  Occupational safety and health workers ... 177
  Oceanographers ... 180
  Optometrists ... 182
  Osteopathic physicians ... 183
  Park, recreation, leisure service workers ... 185
  Personnel and labor relations workers ... 189
  Pharmacists ... 192
  Photographers ... 195

Contents—Continued

Page

Physical therapists.................................... 197
Physicians... 199
Physicists.. 202
Podiatrists 204
Police officers 205
Political scientists...................................... 207
Programmers.. 210
Psychologists... 212
Public relations workers 215
Purchasing agents 218
Radio and television announcers............ 220
Range managers... 221
Real estate sales workers and brokers.... 223
Registered nurses...................................... 226
Securities sales workers 228
Singers.. 230
Social workers.. 231
Sociologists 235

Page

Soil conservationists.................................. 237
Soil scientists.. 239
Speech pathologists and audiologists...... 241
State police officers 242
Statisticians 244
Surveyors 246
Systems analysts.. 248
Teachers... 250
  Kindergarten and elementary school teachers........................... 250
  Secondary school teachers 252
  College and university teachers....... 254
Technical writers 256
Underwriters 260
Urban planners 261
Veterinarians.. 263
Wholesale trade sales workers................. 264

5

I. HOW TO USE THIS BOOK

This chapter of *the Occupational Outlook for College Graduates* tells how the information was assembled and discusses a number of points that need to be kept in mind while interpreting the occupational statements that make up the main body of the book. Chapter II gives suggestions regarding supplementary sources of occupational information and tells how you can keep up to date on developments affecting the employment outlook in different occupations. Chapter III provides information on the sources and methods used to analyze the occupational outlook in different fields of work as well as for college graduates in general. Chapter IV describes some of the most important occupational and industrial employment trends—and their relationship to college graduates—to provide a background for interpreting the reports on individual occupations.

More than one hundred occupations are described in this book, although the total number of occupations in the U.S. economy may be counted in the thousands. The occupational statements that follow the four introductory chapters are reprinted from the 1978–79 edition of the Occupational Outlook Handbook. These occupations generally are those of greatest interest to college students and graduates, and are those for which a college education is required, is becoming increasingly necessary, or is the usual educational background for employment. Occupations covered include workers in professional and related occupations, sales occupations, managerial and administrative occupations, and service occupations. The statements in this publication account for about 90 percent of all workers in professional and related occupations, and for smaller proportions of workers in other major groups. Almost three-fifths of all college graduates work in professional and related occupations; smaller proportions are in other major occupational groups.

An alphabetical list of the occupational reports is provided in the table of contents at the front of the book. Once you have chosen a place to begin—an occupation you'd like to learn more about—you can use the *Occupational Outlook for College Graduates* to find out what the job is like, what education and training are necessary, and what the advancement possibilities, earnings, and employment outlook are likely to be. Each section of this book follows a standard format, making it easier to compare different jobs. What follows is a description of the type of information presented in each statement, with a few words of explanation.

The numbers in parentheses that appear just below the title of most statements are *D.O.T.* code numbers. D.O.T. stands for *Dictionary of Occupational Titles*, now in its fourth edition, a U.S. Department of Labor publication which "defines" each of about 20,000 jobs according to a system that uses numbers to classify each job by the type of work performed, training required, physical demands, and working conditions. Because many users of this book have not yet received the recent fourth edition of the D.O.T., the D.O.T. number accompanying each statement refers to the previous, third edition of that volume.

The **Nature of the Work** section describes the major duties of workers in the occupation. It tells what workers do on the job and how they do it. Although each job description is typical of the occupation, duties are likely to vary by employer and size of employing organization, geographic location, and other factors. In some occupations, individual workers specialize in certain tasks. In others they perform the entire range of work in the occupation. Of course, job duties continually change as technology advances, new industrial processes are developed, and products or services change.

The **Places of Employment** section provides information on the number of workers in an occupation and tells whether they are concentrated in certain industries or geographic areas. Whether an occupation is large or small is important to a jobseeker because large occupations, even those growing slowly, offer more openings than small ones because of the many workers who retire or die each year.

Some occupations are concentrated in particular industries. Most aerospace engineers, for example, are employed in the aircraft and parts industry while accountants are employed in almost every industry. If an occupation is found primarily in certain industries, this section lists them.

A few occupations are concentrated in certain parts of the country. Actors and actresses, for example, usually work in California or New York. This information is included for the benefit of people who have strong preferences about where they live—because they do not wish to be separated from their families and friends, for example. For most occupations, however, employment is widely scattered and generally follows the same pattern as the distribution of the population.

In addition, information on part-time employment is included because it is important to students, homemakers, retired persons, and others who may want to work part time. Knowing which occupations offer good opportunities for part-time work can be a valuable lead.

The **Training, Other Qualifications, and Advancement** section should be read carefully because the decisions you make concerning preparation for an occupation represent a considerable investment of time and money. Early and wise planning toward a career goal can save you unwarranted expenditures later. If you currently are in school, it's a good idea to look closely at the list of high school and college courses regarded as useful preparation for the career you have in mind. Nearly all statements list such courses.

Workers can qualify for jobs in a variety of ways, including completion of a 4-year college curriculum. The section dealing with training generally presents the minimum level and type of education required for the various occupations and the preferred background for entry. In many cases, alternative ways of obtaining training are listed as well. It is worth remembering that the level at which you enter an occupation and the speed with which you advance often are determined by the amount of training you have.

Many occupations are natural stepping stones to others. After working for a time as a programmer, for example, many people advance to jobs as systems analysts. The world of work is dynamic and few workers spend their lives in one or even two occupations. Some have several jobs over a lifetime, changing careers when it is advantageous to do so. Frequently observed patterns of movement from one occupation to another, such as advancement from programmer to systems analyst, are discussed in the *Occupational Outlook for College Graduates*. This type of information can be useful in several ways.

It is helpful to know, for example, that skills gained working at one job can make you more employable in another—perhaps a job that is more desirable in terms of earnings, working conditions, or scope for self-expression. On the other hand, it also is useful to know which jobs offer the most opportunity for transferring to other work of a similar nature. Persons trained in electrical or chemical engineering, for example, frequently can transfer to another engineering specialty where they can apply general engineering knowledge in different ways.

It usually is wise, however, to discuss the patterns of job transfer and advancement described in the *Occupational Outlook for College Graduates* with counselors, local employers, and others who know about the particular job market where you want to work. Typical patterns of movement from one occupation to another may not apply in every employment setting.

All States have certification or licensing requirements for some occupations. Physicians and elementary and secondary school teachers are examples of occupations that are licensed. If you are considering occupations that require State licensing, be sure to check the requirements in the State in which you plan to work.

An important factor in career choice is the extent to which a particular job suits your personality. Although it often is difficult for people to assess themselves, your counselor undoubtedly is familiar with tests that can help. Each statement provides information which allows you to match your own unique personal characteristics—your likes and dislikes—with the characteristics of the job. For a particular job, you may need the ability to:

—make responsible decisions.

—motivate others.

—direct and supervise others.

—work under close supervision.

—work in a highly competitive atmosphere.

—enjoy working with ideas and solving problems.

—enjoy working with people.

—enjoy working with things—good coordination and manual dexterity are necessary.

—work independently—initiative and self-discipline are necessary.

—work as part of a team.

—enjoy working with detail, either numbers or technical written material.

—enjoy helping people.

—use creative talents and ideas and enjoy having an opportunity for self-expression.

—derive satisfaction from seeing the physical results of your work.

—work in a confined area.

—perform repetitious work.

—enjoy working outside, regardless of the weather.

The **Employment Outlook** section discusses prospective job opportunities. Knowing whether or not the job market is likely to be favorable is important in deciding whether to pursue a specific career. While your interests, your abilities, and your career goals are significant, you also need to know something about the availability of jobs in the fields that interest you most.

The employment outlook section of most of the statements in the *Occupational Outlook for College Graduates* begins with a sentence about expected employment growth through 1985. The occupation or industry is described as likely to grow about as fast as the average for all occupations or industries; faster than the average; or more slowly than the average (figure I). *Job opportunities in a particular occupation or industry usually are favorable if employment increases at least as rapidly as in the economy as a whole. Occupations or industries in which employment stays about the same or declines generally offer less favorable job prospects than those that are growing because the only openings are those due to deaths, retirements, and other separations from the labor force.*

Some statements take note of the effect of fluctuations in economic activity. This information is valuable to people looking into long-range career possibilities at a time when the economy is in a recession. Persons understandably wonder: What will the economy be like when I enter the labor market? Will it be harder to find a job 5 or 10 years from now than it is today? The *Occupational Outlook for College Graduates* gives information, wherever feasible, on occupations and industries whose levels of employment fluctuate in response to shifts in the economic climate. It is important to bear in mind that employment in many—but not all—occupations and industries is directly affected by an economic downturn. A sharp improvement in the outlook for these occupations

Figure I

Description	*Projected 1976–85 change in employment requirements*
Much faster than the average for all occupations	50.0 percent or greater
Faster than the average for all occupations	25.0 to 49.9 percent
About as fast as the average for all occupations [1]	15.0 to 24.9 percent
More slowly than the average for all occupations	5.0 to 14.9 percent
Little change is expected	4.9 to −4.9 percent
Expected to decline	−5.0 percent or greater

[1] The average increase projected for all occupations for the 1976–85 period is 19.2 percent.

and industries is likely as the economy picks up. However, other occupations and industries are less affected by short-term changes in economic activity. Other factors influence their growth or decline. These matters are explored in a number of statements.

For some occupations, information is available on the supply of workers--that is, the number of people pursuing the type of education or training needed and the number subsequently entering the occupation. When such information is available, the *Occupational Outlook for College Graduates* describes prospective job opportunities in terms of the expected demand-supply relationship. The prospective job situation is termed "excellent" when demand is likely to greatly exceed supply; "keen competition" when supply is likely to exceed demand. Other terms used are shown in Figure II.

Workers who transfer in to one occupation from another sometimes are a significant component of supply; similarly, those who transfer out may have a substantial effect on demand because their leaving usually creates a job opening. Although the information currently available on transfers among occupations is limited, some statements discuss transfer patterns and their effect on the supply for certain occupations. The employment outlook for engineers, for example, notes that transfers into the field are likely to constitute a substantial portion of supply if past trends continue.

The information in this section should be used carefully. Getting a job may be difficult if the field is so small that openings are few (actuaries and range managers are examples) or so popular that it attracts many more jobseekers than there are jobs (radio and television broadcasting, journalism, and the performing arts). Getting a job also can be difficult in occupations and industries in which employment is declining (merchant marine), although this is not always the case. But even occupations that are small or overcrowded provide some jobs. So do occupations in which employment is growing very slowly or even declining, for there is a need to replace workers who leave the occupation. If the occupation is large, the number of job openings arising from replacement needs can be quite substantial. Accountants and real estate agents and brokers are examples of large occupations that provide a significant number of job openings each year because workers leave. Openings resulting from replacement needs are expected to account for nearly two-thirds of all job openings for the labor force as a whole.

An assessment of the overall job market for college graduates is presented in Chapter IV. It compares the number of college graduates likely to seek jobs through 1985 with the projected number of openings in the types of jobs usually sought by graduates.

How reliable is the information on the outlook for employment over the next 10 years? No one can predict future labor market conditions with perfect accuracy. In every occupation and industry, the number of jobseekers and the number of job openings constantly changes. A rise or fall in the demand for a product or service affects the number of workers needed to produce it. New inventions and technological innovations create some jobs and eliminate others. Changes in the size or age distribution of the population, work attitudes, training opportunities, or retirement programs determine the number of workers available. As these forces interact in the labor market, some occupations experience a shortage, some a surplus, some a balance between jobseekers and openings. Methods used by economists to develop information on future occupational prospects differ, and judgments that go into any assessment of the future also differ. Therefore, it is important to understand what underlies each statement on outlook.

For every occupation and industry covered in the *Occupational Outlook for College Graduates*, an estimate of future employment needs is developed. These estimates are consistent with a set of assumptions about the future of the economy and the country. For more detail, see the section entitled, Assumptions and Methods Used In Preparing the Employment Projections.

Finally, you should remember that job prospects in your community or State may not correspond to the description of the employment outlook in this book. For the particular job you are interested in, the outlook in your area may be better, or worse. The *Occupational Outlook for College Graduates* does not discuss the outlook in local areas because the analysis is far too much for a centralized staff to handle. Such information has been developed, however, by many States and localities. The local office of your State employment service is

Figure II

Job opportunities	*Prospective demand-supply relationship*
Excellent	Demand much greater than supply
Very good	Demand greater than supply
Good or favorable	Rough balance between demand and supply
May face competition	Likelihood of more supply than demand
Keen competition	Supply greater than demand

the best place to ask about local-area employment projections. Names and addresses of these State and local information sources and suggestions for additional information on the job market are given in the following section, Where to Go for More Information.

The **Earnings** section helps answer many of the questions that you may ask when choosing a career. Will the income be high enough to maintain the standard of living I want and justify my training costs? How much will my earnings increase as I gain experience? Do some areas of the country or some industries offer better pay than others for the same type of work?

Like most people, you probably think of earnings as money. But money is only one type of financial reward for work. Paid vacations, health insurance, uniforms, and discounts on clothing or other merchandise also are part of total earnings.

About 9 out of 10 workers receive money income in the form of a *wage or salary*. A wage usually is an hourly or daily rate of pay, while a salary is a weekly, monthly, or yearly rate. Most craft workers, operatives, and laborers are wage earners, while most professional, technical, and clerical workers are salary earners.

In addition to their regular pay, wage and salary workers may receive extra money for working overtime, or on a night shift or irregular schedule. In some occupations, workers also may receive tips or be paid a commission based on the amount of sales or services they provide to customers. Factory workers are sometimes paid a piece rate, which is an extra payment for each item they produce. For many workers, these types of pay amount to a large part of their total earnings.

The remaining 10 percent of all workers are in business for themselves and earn *self-employment income* instead of wages or salaries. This group includes workers in a wide variety of occupations: Physicians, shopkeepers, writers, and farmers are examples of workers who frequently are self-employed.

Workers in some occupations earn self-employment income in addition to their wages or salaries. For example, salaried lawyers often have a private practice as well, seeing clients during evenings or weekends, and college professors frequently are paid for publishing articles based on independent research.

Besides money income, most wage and salary workers receive a variety of *fringe benefits* as part of their earnings on the job. Several are required by Federal and State law, including social security, workers' compensation, and unemployment insurance. These benefits provide income to persons when they are not working because of old age, work-related injury or disability, or lack of suitable jobs.

Among the most common fringe benefits are paid vacations, holidays, and sick leave. In addition, many workers are covered by life, health, and accident insurance; participate in retirement plans; and are entitled to supplemental unemployment benefits. All of these benefits are provided—in part or in full—through their employers. Some employers also offer stock options and profit-sharing plans, savings plans, and bonuses.

Workers in many occupations receive part of their earnings in the form of goods and services, or *payments in kind*. Sales workers in department stores, for example, often receive discounts on merchandise. Workers in other jobs may receive free meals, housing, business expense accounts, or free transportation on company-owned planes.

Which jobs pay the most? This is a difficult question to answer because good information is available for only one type of earnings—wages and salaries—and for some occupations even this is unavailable. Nevertheless, the *Occupational Outlook for College Graduates* does include some comparisons of earnings among occupations. Most statements indicate whether earnings in an occupation are greater than or less than the average earnings of workers who are not supervisors and work in private industry, but not in farming. This group represented about 60 percent of all workers in 1976 and had the most reliable earnings data currently available for comparison purposes.

Besides differences among occupations, many levels of pay exist within each occupation. Beginning workers almost always earn less than those who have been on the job for some time because pay rates increase as workers gain experience or do more responsible work.

Earnings in an occupation also vary by geographic location. The average weekly earnings of beginning computer programmers, for example, vary considerably from city to city. (See table 1.) The highest earnings of the nine cities listed occurred in Detroit, Mich., and the lowest in Chattanooga, Tenn. Although it is generally true that earnings are higher in the North Central and Northeast regions than in the West and South, there are exceptions. You also should remember that those cities which offer the highest earnings are often those in which it is most expensive to live.

In addition, workers in the same occupation may have different earnings depending on the industry in which they work. For example, in 1976, engineers with 18 to 20 years experience averaged $28,750 a year

Table 1. Average weekly earnings of beginning computer programmers, 1976, by selected city

City	Average weekly earnings
Detroit	$239.50
New York	239.00
Cleveland	238.00
Chicago	230.00
San Francisco-Oakland	229.50
Greenville-Spartanburg, S.C.	201.50
Baltimore	193.00
Salt Lake City-Ogden	190.00
Chattanooga	185.50

SOURCE: Bureau of Labor Statistics.

Table 2. Average annual salaries of chemists, with Ph.D. degrees, by type of work, 1976

Type of work	Annual salaries
Management	$36,500
Marketing and technical services	29,500
Research and development	25,300
Teaching	20,500
Other	26,900

SOURCE: American Chemical Society.

in research organizations and research laboratories, $26,500 in manufacturing, $25,400 in construction, and $20,700 in State government.

Salaries also vary by the type of work a person performs. The salaries of Ph. D. chemists, for example, vary considerably depending on the specific nature of the job, as shown in table 2. In 1976, chemists in management jobs earned $7,000 a year more than those in marketing and technical services. Chemists in research and development, however, earned $4,200 less than those in marketing, but $4,800 more than chemistry professors.

Because of these variations in earnings, you should check with a counselor or with local employers if you are interested in specific earnings information for occupations in your area.

The **Working Conditions** section provides information on factors that can affect job satisfaction because preferences for working conditions vary considerably among individuals. Some people, for example, prefer outdoor work while others prefer working in an office. Some people like the variety of shift work, and others want the steadiness of a 9-to-5 job. Following is a list of several working conditions that apply to some of the occupations in the *Occupational Outlook for College Graduates*.

Overtime work. When overtime is required on a job, employees must give up some of their free time and need to be flexible in their personal lives. Overtime, however, does provide the opportunity to increase earning power.

Shift work. Evening or night work is part of the reqular work schedule in some jobs. Employees who work on these shifts usually are working while most other people are off. Some persons prefer shift work, however, because they can pursue certain daytime activities, such as hunting, fishing, or gardening.

Environment. Work settings vary from clean, air-conditioned offices to places that are dirty, greasy, or poorly ventilated. By knowing the setting of jobs you find interesting, you can avoid an environment that you may find particularly unpleasant.

Outdoor work. Persons who work outdoors are exposed to all types of weather. This may be preferred to indoor work, however, by those who consider outdoor work more healthful.

Hazards. In some jobs employees are subject to possible burns, cuts, falls, and other injuries and must be careful to follow safety precautions.

Physical demands. Some jobs require standing, stooping, or heavy lifting. You should be sure that you have the physical strength and stamina required before seeking one of these jobs.

Considering working conditions when you make up your mind about a career can help you choose a job that brings you satisfaction and enjoyment.

II. WHERE TO GO FOR MORE INFORMATION

Whether you have questions about a particular job or are trying to compare various fields, the *Occupational Outlook for College Graduates* is a good place to begin. It will introduce you to some of the important aspects of an occupation and answer many of your initial questions. But the *Occupational Outlook for College Graduates* is only one of many sources of information about jobs and careers. After reading a few statements, you may decide that you want more detailed information about a particular occupation. Or you may want to find out where you can find this kind of work in your community or where you can go for appropriate training. If you are willing to make an effort, you will discover a wealth of occupational information—much of it available at little or no cost.

Sources of Career Information

Much information on careers is put out by government, industry, trade unions, schools, professional associations, private guidance services, and other organizations. You should be careful in assessing any single piece of career guidance material. Keep in mind the date and source, in particular. Material that is too old may contain obsolete or even misleading information. Be especially cautious about accepting information on employment outlook, earnings, and training requirements if it is more than 5 years old. You also need to consider the source—and thus the intent—of the career guidance material you obtain.

Although some occupational materials are produced solely for the purpose of objective vocational guidance, others are produced for recruitment purposes. You should be wary of biased information, which may tend to leave out important items, overglamorize the occupation, overstate the earnings, or exaggerate the demand for workers.

School counselors can be a very important source of guidance information. Counselors should be able to refer you to the different types of career materials available in your school or community. They are likely to be familiar with the job market. They also can discuss entry requirements and costs of the schools, colleges, or training programs that offer preparation for the kind of work in which you are interested. Most important of all, your counselor can help you consider the occupational information you obtain in relation to your own abilities, personal aspirations, and career goals.

Guidance offices usually have collections of career information. In fact, the book that you're reading now may have come from the guidance office. Find out what else the office has to offer.

Some schools have **career centers**; often, these are located in or near the library or media center. Career centers provide a sampling of printed and audiovisual career information materials, and also may offer individual counseling, group discussions, guest speakers, and field trips.

Libraries have books, brochures, magazines, and audiovisual materials that contain information about jobs and careers. Check your school library or media center, of course—but don't forget the public library. Many libraries have pamphlet files devoted to specific occupations. Some libraries also have collections of filmstrips, records and tapes, and microfilms with occupational information. The reference shelf undoubtedly contains one directory or more that you will find useful if you want to get the names of specific schools, colleges, or business concerns. The library staff can direct you to the information best suited to your needs.

Trade unions, business firms, trade associations, professional societies, and educational institutions all publish career information, and much of this is available for the asking.

The Sources of Additional Information section at the end of most statements lists organizations you can write to. This is a good way to begin. For the names and addresses of other organizations, consult the directories on your library's reference shelf. There, you are likely to find directories that list:

—trade associations.

—professional associations.

—business firms.

—junior and community colleges.

—colleges and universities.

—home study and correspondence programs.

—business, trade, and technical schools.

—sources of scholarships and financial aid.

Your school library or career center may have one directory or more put out by commercial publishers that list sources of career information by occupation.

Another useful directory is the U.S. Office of Education's *Directory of Postsecondary Schools with Occupational Programs, 1973-74*, which lists schools offering specific occupational training programs. The directory lists private business, trade, and technical schools as well as community and junior colleges and 4-year colleges and universities.

Computer-assisted occupational information systems have been installed in some schools and career centers. These systems allow users to obtain career information stored in a computer by entering specific requests and receiving immediate answers. Through the occupational information systems, users are able to examine the ways in which different personal abilities, interests, and preferences are related to different occupations. The U.S. Department of Labor is currently providing funds for such systems in eight States.

Don't overlook the importance of **personal contacts**. An interview with someone in a particular job can often tell you much more than a booklet or brochure can. By asking the right questions, you find out what kind of training is really important, how workers got their first jobs as well as the one they're in now, and what they like and dislike about the work.

State employment security agencies in many States publish career briefs for dozens of different occupations and industries. These briefs usually describe earnings and job outlook information for a particular State—and sometimes for a city or metropolitan area. By contrast, the *Occupational Outlook for College Graduates* gives information for the Nation as a whole. In addition, a number of States publish brochures on writing resumes, finding job openings, preparing for interviews, and other aspects of a job search. To find out what materials are available for your State, consult the U.S. Employment and Training Administration's1976 *Guide to Local Occupational Information*. Or write directly to the chief information officer in your State employment security agency. Following is a list of their titles and addresses:

Alabama

Public Information Officer, Department of Industrial Relations, Industrial Relations Bldg., 649 Monroe St., Montgomery, Ala. 36130.

Alaska

Information Officer, Employment Security Division, Department of Labor, P.O. Box 3-7000, Juneau, Alaska 99811.

Arizona

Chief of Information and Education, Arizona State Employment Security Commission, P.O. Box 6123, Phoenix, Ariz. 85005.

Arkansas

Public Information Officer, Employment Security Division, P.O. Box 2981, Little Rock, Ark. 72203.

California

Public Information Section, Employment Development Department, 800 Capitol Mall, Sacramento, Calif. 95814.

Colorado

Public Information Officer, Division of Employment, Department of Labor and Employment, 251 East 12th Ave., Denver, Colo. 80203.

Connecticut

Public Information Supervisor, Connecticut Employment Security Division, 200 Folly Brook Blvd., Weatherfield, Conn. 06109.

Delaware

Secretary, Department of Labor, 801 West 14th St., Wilmington, Del. 19899.

District of Columbia

[illegible] Community Relations and Information Office, D.C. Department of Manpower, Room 601, 500 C St. NW., Washington, D.C. 20212.

Florida

Information Director, Florida Department of Commerce, Collins Bldg., Tallahassee, Fla. 32304.

Georgia

Chief of Public Relations and Information, Georgia Department of Labor, 254 Washington St. SW., Atlanta, Ga. 30334.

Hawaii

Information Specialist, Department of Labor and Industrial Relations, 825 Mililani St., Honolulu, Hawaii 96813.

Idaho

Public Information Coordinator, Department of Employment, P.O. Box 35, Boise, Idaho 83707.

Illinois

Director, Communications and Public Information, Illinois Department of Labor, State Office Bldg., Room 705, Springfield, Ill. 62706.

Indiana

Director of Information and Education, Employment Security Division, 10 North Senate Ave., Indianapolis, Ind. 46204.

Iowa

Chief of Information Services, Employment Security Commission, 1000 East Grand Ave., Des Moines, Iowa 50319.

Kansas

Public Relations Director, Department of Human Resources, 401 Topeka Ave., Topeka, Kans. 66603.

Kentucky

Supervisor, Public Information, Department of Human Resources, 592 East Main St., Frankfort, Ky. 40601.

Louisiana

Public Relations Director, Department of Employment Security, P.O. Box 44094, Baton Rouge, La. 70804.

Maine

Chairman, Employment Security Commission, 20 Union St., Augusta, Maine 04330.

Maryland

Director of Public Relations, Department of Employment and Social Services, Room 601. 1100 North Eutaw St., Baltimore, Md. 21201.

Massachusetts

Supervisor of Information, Division of Employment Security, Hurley Bldg., Government Center, Boston, Mass. 02114.

Michigan

Director, Information Services Division, Employment Security Commission, Department of Labor Bldg., 7310 Woodward Ave., Detroit, Mich. 48202.

Minnesota

Director of Public Information, Department of Employment Services, 390 North Robert St., St. Paul, Minn. 55101.

Mississippi

Public Relations Representative, Employment Security Commission, P.O. Box 1699, Jackson, Miss. 39205.

Missouri

Information Supervisor, Division of Employment Security, Department of Labor and Industrial Relations, P.O. Box 59, Jefferson City, Mo. 65101.

Montana

Information Officer, Employment Security Division, P.O. Box 1728, Helena, Mont. 59601.

Nebraska

Information Officer, Division of Employment, Department of Labor, P.O. Box 94600, State House Station, Lincoln, Nebr. 68509.

Nevada

Public Information Officer, Employment Security Department, 500 East Third St., Carson City, Nev. 89701.

New Hampshire

Commissioner, Department of Employment Security, 32 South Maine St., Concord, N.H. 03301.

New Jersey

Director of Public Information, Division of Employment Security, Department of Labor and Industry, John Fitch Plaza, Trenton, N.J. 08625.

New Mexico

Information Officer, Employment Security Commission, P.O. Box 1928, Albuquerque, N. Mex. 87103.

New York

Director, Division of Research and Statistics, Department of Labor, 2 World Trade Center, New York, N.Y. 10047.

North Carolina

Communications and Information Specialist, Employment Security Commission, P.O. Box 25903, Raleigh, N.C. 27602.

North Dakota

Public Information Section, Employment Security Bureau, 145 South Front St., Bismarck, N. Dak. 58501.

Ohio

Public Information Officer, Bureau of Employment Services, 145 South Front St., Columbus, Ohio 43216.

Oklahoma

Information Director, Employment Security Commission, Will Rogers Memorial Office Bldg., Oklahoma City, Okla. 73105.

Oregon

Information Officer, Employment Division, 875 Union St. NE., Salem, Oreg. 97310.

Pennsylvania

Director of Public Relations, Bureau of Employment Security, Department of Labor and Industry Bldg., 7th and Forster Sts., Harrisburg, Pa. 17121.

Puerto Rico

Information Officer, Bureau of Employment Security, 414 Barbosa Ave., Hato Rey, P.R. 00917.

Rhode Island

Information Officer, Department of Employment Security, 24 Mason St., Providence, R.I. 02903.

South Carolina

Public Information Director, Employment Security Commission, P.O. Box 995, Columbia, S.C. 29202.

South Dakota

Public Information Director, Department of Labor, Office Bldg. No. 2, Pierre, S. Dak. 57501.

Tennessee

Chief of Public Relations, Department of Employment Security, 519 Cordell Hull Bldg., Nashville, Tenn. 37219.

Texas

Public Information Officer, Texas Employment Commission, TEC Bldg., 15th and Congress Ave., Austin, Tex. 78778.

Utah

Public Relations Director, Department of Employment Security, P.O. Box 11249, Salt Lake City, Utah 84111.

Vermont

Public Information Officer, Department of Employment Security, P.O. Box 488, Montpelier, Vt. 05602.

Virginia

Director, Information Services, Virginia Employment Commission, P.O. Box 1358, Richmond, Va. 23211.

Washington

Information Officer, Employment Security Department, P.O. Box 367, Olympia, Wash. 98504.

West Virginia

Information Representative, Department of Employment Security, 4407 McCorkle Ave. SE., Charleston, W. Va. 25305.

Wisconsin

Director of Information, Department of Industry, Labor, and Human Relations, P.O. Box 2209, Madison, Wis. 53701.

Wyoming

Information Officer, Employment Security Commission, P.O. Box 2760, Casper, Wyo. 82601.

Career Information for Special Groups

Certain groups of jobseekers face special difficulties in obtaining suitable and satisfying employment. All too often, veterans, youth, handicapped persons, members of ethnic and racial minorities, older workers, and women experience difficulty in the labor market. Choosing a career wisely and realistically is important for everyone, but it is doubly important for members of these groups. Special counseling, training, and placement are available in many communities—through the public employment service, community service agencies, or other organizations.

In addition, literature on career guidance and vocational training for special labor force groups is available from the Federal Government. Most of these publications can be obtained free of charge. Following are selected examples:

Youth

Employment and Training for Youth. (program fact sheet), February 1977.

Office of Information, Inquiries Section, Room 10225, Employment and Training Administration, U.S. Department of Labor, 601 D St. NW., Washington, D.C. 20213.

A Message to Young Workers About the Fair Labor Standards Act, As Amended in 1974. (WH Publication 1236), 1976.

Office of Information, Room 4331, Employment Standards Administration, U.S. Department of Labor, 200 Constitution Ave. NW., Washington, D.C. 20210.

Mentally handicapped

These, Too, Must Be Equal:America's Needs in Habilitation and Employment of the Mentally Retarded, 1974.

President's Committee on Mental Retardation, Regional Office Building, 7th and D Sts. SW., Washington, D.C. 20201.

Guide to Job Placement of Mentally Retarded Workers.
Preparing for Work, 1975.
How to Get a Job.
Jobs and Mentally Retarded People, 1974.

President's Committee on Employment of the Handicapped, Room 600, Vanguard Building, 1111 20th St. NW., Washington, D.C. 20036.

Affirmative Action to Employ Handicapped People.

Office of Information, Room 4331, Employment Standards Administration, U.S. Department of Labor, 200 Constitution Ave. NW., Washington, D.C. 20210.

Physically handicapped

Careers for the Homebound.
People at Work:50 Profiles of Men and Women With MS, 1975.

President's Committee on Employment of the Handicapped, Room 600, Vanguard Building, 1111 20th St. NW., Washington, D.C. 20036.

Affirmative Action to Employ Handicapped People.

Office of Information, Room 4331, Employment Standards Administration, U.S. Department of Labor, 200 Constitution Ave. NW., Washington, D.C. 20210.

Older workers

The Law Against Age Discrimination in Employment. (WH Publication 1303).

Office of Information, Room 4331, Employment Standards Administration, U.S. Department of Labor, 200 Constitution Ave. NW., Washington, D.C. 20210.

Services for Older Workers. (program fact sheet), April 1977.

Memo to Mature Jobseekers, 1977.

Office of Information, Inquiries Section, Room 10225, Employment and Training Administration, U.S. Department of Labor, 601 D St. NW., Washington, D.C. 20213.

Employment and Volunteer Opportunities for Older People. (AoA Fact Sheet), Revised 1976.

National Clearinghouse on Aging, Room 4146, U.S. Department of Health, Education, and Welfare, 330 Independence Ave. SW., Washington, D.C. 20201.

Women

Steps to Opening the Skilled Trades to Women, June 1974.

Why Not be an Apprentice and Become a Skilled Craft Worker. (leaflet 52), 1974.

Publications of the Women's Bureau, January 1977.

Selected Sources of Career Information, 1974.

Women's Bureau, Employment Standards Administration, U.S. Department of Labor, 200 Constitution Ave. NW., Washington, D.C. 20210.

Veterans

Out of the Service and Looking for a Job? Here's Help!, 1976.

Veterans for Hire: Good Business, 1976.

Office of Information, Inquiries Section, Room 10225, Employment and Training Administration, U.S. Department of Labor, 601 D St. NW., Washington, D.C. 20213.

Veterans Readjustment Appointments—Questions and Answers.(BRE-36), revised 1977.

Bureau of Recruiting and Examining, Room 6552, Civil Service Commission, 1900 E St. NW., Washington, D.C. 20415.

The following publications are available from VA regional offices (listed in the telephone directory under "United States Government—Veterans Administration") or from:

Department of Veterans Benefits - 232A, Veterans Administration Central Office, 810 Vermont Ave. NW., Washington, D.C. 20420.

Apprenticeship or Other On-Job Training Benefits for Veterans With Service Since January 31, 1975. (VA pamphlet 20-69-4), March 1975.

A Summary of Employment Benefits and Opportunities for Vietnam Era Veterans. (VA pamphlet 20-69-6), December 1974.

Information on Finding a Job

Do you need help in finding a job? For information on job openings, follow up as many leads as possible. Parents, neighbors, teachers, and counselors may know of jobs. Check the want ads. Investigate the local office of your State employment service. And find out whether private or nonprofit employment agencies in your community can help you. The following section will give you some idea of where you can go to look for a job and what sort of help to expect.

Informal job search methods. Informal methods of job search are the most popular, and also the most effective. Informal methods include direct application to employers with or without referral by friends or relatives. Jobseekers locate a firm that might employ them and file an application, often without certain knowledge that an opening exists.

You can find targets for your informal search in several ways. The Yellow Pages and local chambers of commerce will give you the names and addresses of appropriate firms in the community where you wish to work. You can also get listings of most firms in a specific industry—banking, insurance, manufacturing, and newspaper publishing, for example—by consulting one of the directories on the reference shelf of your public library. Friends and relatives may suggest places to apply for a job, and people you meet in the course of your job search are also likely to give you ideas.

Want ads. The "Help Wanted" ads in a major newspaper contain hundreds of job listings. As a job search tool, they have two advantages: They are cheap and easy to acquire, and they often result in successful placement. There are disadvantages as well. Want ads give a distorted view of the local labor market, for they tend to underrepresent small firms. They also tend to overrepresent certain occupations, such as clerical and sales jobs. How helpful they are to you will depend largely on the kind of job you seek.

Bear in mind that want ads do not provide complete information; many ads give little or no description of the job, working conditions, and pay. Some ads omit the identity of the employer. In addition, firms often run multiple listings. Some ads offer jobs in other cities (which do not help the local worker); others advertise employment agencies rather than employment.

If you use the want ads, keep the following suggestions in mind:

* Don't rely *exclusively* on the want ads; follow up other leads, too.

* Answer ads promptly. The opening may be filled before the ad stops running.

* Follow the ads diligently. Checking them every day as early as possible gives you the best advantage over other applicants, which may mean the difference between a job and a rejection.

* Don't expect too much from "blind ads" that do not reveal the employer's identity. Employers use blind ads to avoid being swamped with applicants, or to fill a particular vacancy quietly and confidentially. The chances of finding a job through blind ads tend to be slim.

* Be cautious about answering "no experience necessary" ads. Most employers are able to fill job openings that do not require experience without advertising in the newspaper. This type of ad may mean that the job is hard to fill because of low wages or poor working conditions, or because it is straight commission work.

Public employment service. The public employment service, also called the Job Service, can be a good source of information about job openings in your community. Employment security (ES) agencies in each of the 50 States and the District of Columbia are affiliated with the U.S. Employment Service, and provide their services without charge. Operating through a network of 2,500 local offices, State agencies help jobseekers find employment and help employers find qualified workers. To find the office nearest you, look in the State government telephone listings under "Job Service" or "Employment." If the local office does not provide the information or services you are looking for, write to the information officer in your State capital. Addresses are given in the first section of this chapter.

General services. Assuming you come to your local employment service office because you're looking for a job, the first step is to fill out an application that asks for general background and work history. To speed up the process, you should bring along complete information on previous jobs, including dates of employment, names and addresses of employers, and pay levels.

After completing the application, you will talk briefly with an interviewer in order to be classified into a particular job cluster—professional and management, sales, clerical, and so forth. This process, although crucial, takes very little time. If you have specific training and experience and know exactly what you want, the initial interview may suffice. Most applicants, however, can benefit from additional guidance services, which are available on request. The unskilled and inexperienced may take a general aptitude test battery that measures their abilities, and a vocational interest questionaire that measures their occupational interests. Specific tests in typing and shorthand may also be given.

You may also talk at length with occupational counselors. These counselors, or interviewers, can assist in a wide range of areas. They can help you pinpoint a suitable field of interest, suggest training programs and other means of preparing for a particular occupation, or simply advise you on compiling a resume.

One other aspect of your local office's services deserves particular attention—the occupational registers. Employment service offices often maintain files of resumes of qualified workers in professional, clerical, and craft occupations, for use by employers seeking such workers. Ask to have your resume filed in the appropriate register.

Job Information Service. The Job Information Service (JIS) plays an important role in matching workers and jobs. JIS provides a self-service listing of job openings, as well as a library of occupational and job search literature. Employment service offices in most large cities have a Job Bank as well--a computerized file of job openings, revised and printed out daily. Because it is self-service, the JIS unit is meant for applicants who know what kind of work they are qualified to do. Those applicants can look over Job Bank listings and select the openings they want to apply for. This gives them quick access to job information and frees employment service staff to spend more time with clients who need personal assistance.

The JIS may include the Job Bank Openings Summary (JBOS) and the Job Bank Frequently Listed Openings Report (JOB-FLO). JBOS is a monthly report that provides information on job opportunities listed during the previous month in Job Banks across the Nation. JOB-FLO provides similar information, but focuses on the "high volume" occupations—those with the greatest number of openings. JBOS and JOB-FLO may not help you find a particular opening, but they can describe employment trends in a particular city or pinpoint the cities that have the greatest numbers of openings in a particular occupation.

The JIS also includes a monthly publication, entitled "Occupations in Demand," that reports the number and locations of openings in high-demand occupations during the previous month. It is designed to be easily read by the average jobseeker and can be found in libraries and counseling offices as well as at the employment service.

Special services. Serving people with job market disadvantages is an important function of the employment service, and many local offices have specially trained counselors who advise veterans, youth, handicapped, or older workers.

By law, veterans are entitled to priority in interviewing, counseling, testing, job development, and job placement. Special counselors called veterans reemployment representatives are trained to deal with the particular problems of veterans, many of whom find it difficult to readjust to civilian life. While such veterans often face multiple problems, joblessness alone is a major barrier to resuming an ordinary life. Special help for disabled veterans begins with outreach units in each State, whose job it is to identify jobless disabled veterans and make them aware of the many kinds of assistance available to them.

As part of the effort to reduce excessive youth unemployment, local employment service offices test and counsel young people, and refer them to training programs or jobs whenever possible. These offices also manage summer youth programs. Youthful jobseekers from very poor families receive information on the various kinds of federally funded job programs for young people, including part-time and work-experience projects and the Job Corps.

For people with mental or physical disabilities, the employment service provides assistance in making realistic job choices, and in overcoming problems related to getting and holding jobs. Job openings for handicapped workers are listed as well. Often, these openings are with government contractors and other firms that are making a positive effort to employ handicapped workers.

Older worker specialists in many local employment service offices assist middle-aged and older workers, whose job search generally differs from that of younger workers. Both counseling and placement services are tailored to the unique needs of older workers. Jobseekers over 55 who have very low incomes may be referred to one of the thousands of part-time, community service jobs for the elderly funded by the Federal Government.

Private employment agencies. In the appropriate section of the classified ads or the telephone book you can find numerous advertisements for private employment agencies. All are in business to make money, but some offer higher quality service and better chances of successful placement than others.

The three main places in which private agencies advertise are newspaper want ads, the Yellow Pages, and trade journals. Telephone listings give little more than the name, address, phone number, and specialty of the agency, while trade journals only list openings for a particular occupation, such as accountant or computer programmmer. Want ads, then, are the best source of general listings of agencies.

These listings fall into two categories—those offering specific openings and those offering general promise of employment. You should concentrate on the former, using the latter only as a last resort. With a specific opening mentioned in the ad, you have greater assurance of the agency's desire to place qualified individuals in suitable jobs.

When responding to such an ad, you may learn more about the job over the phone. If you are interested, visit the agency, fill out an application, present a resume, and talk with an interviewer. The agency will then arrange an interview with the employer if you are qualified, and perhaps suggest alternative openings if you are not.

Most agencies operate on a commission basis, with the fee contingent upon a successful match. Agencies advertising "no fees, no contracts" are paid by the employer and charge the applicant nothing. Many other agencies, however, do charge their applicants. You should find out before using them exactly what the services will cost you.

Community agencies. A growing number of nonprofit organizations throughout the Nation provide counseling, career development, and job placement services. These agencies generally concentrate on services for a particular labor force group—women, the elderly, youth, minorities, or ex-offenders, for example.

Community employment agencies serve an important function in providing the extensive counseling that many disadvantaged jobseekers require. They often help their clients resolve personal, family, or other fundamental problems that may stand in the way of finding a suitable job. Some agencies provide necessary job training, while others refer their clients to training programs elsewhere. For the most part, these community agencies take a strong active interest in their clients, and provide an array of services designed to help people find and keep jobs.

It's up to you to discover whether there are such agencies in your community—and whether they can help you. The State employment service should be able to tell you whether such an agency has been established in your community. If the local office cannot help, write the State information officer. Your church, synagogue, or local library may have the information, too. The U.S. Department of Labor is another possible source of information, for many of these agencies receive some or all of their funding from the Federal Government, through the Comprehensive Employment and Training Act (CETA). Among its many and varied provisions, CETA authorizes Federal money for local organizations that offer job counseling, training, and placement help to unemployed and disadvantaged persons. For further information, write:

Office of Comprehensive Employment Development, Employment and Training Administration, U.S. Department of Labor, Room 6000, 601 D St. NW., Washington, D.C., 20213; or the Office of Information, Room 10406, at the same address.

Another likely source of information is the U.S. Department of Labor's *Directory for Reaching Minority Groups*. Although the 1973 directory is out of print, a revised edition is being prepared, and will list organizations that provide job information, training, and other services to minorities. For information, write to:

Bureau of Apprenticeship and Training, U.S. Department of Labor, 601 D St. NW., Washington, D.C. 20213.

A directory that lists employment counseling and advocacy organizations for women is available for a nominal charge from:

Wider Opportunities for Women (WOW), 1649 K St. NW., Washington, D.C., 20006.

College career planning and placement offices. For those who have access to them, career planning and placement offices at colleges and universities offer the jobseeker many valuable services. Like the community agencies that serve disadvantaged jobseekers by offering supportive services, college placement offices function as more than just employment agencies. In addition to counseling, they teach students to acquire jobseeking skills. They emphasize writing resumes and letters of application, making a list of possible employers, preparing for interviews, and other aspects of job searching. College placement offices offer other services, too. At larger campuses they bring students and employers together by providing schedules and facilities for interviews with industry recruiters. Many offices also maintain lists of local part-time and temporary jobs, and some have files of summer openings.

Labor Market Information

All State employment security agencies develop detailed labor market data needed by employment and training specialists and educators who plan for local needs. Such information helps policymakers decide whether or not to expand a vocational training program, for example—or drop it altogether. Jobseekers and counselors also may find these studies helpful. Typically, State agencies publish reports that deal with future occupational supply, characteristics of the work force, changes in State and area economic activities, and the employment structure of important industries. For all States, and for nearly all Standard Metropolitan Statistical Areas (SMSA's) of 50,000 inhabitants or more, data are available that show current employment as well as estimated future needs. This information is very detailed; generally, each State issues a report covering current and future employment for as many as 200 industries and 400 occupations. In addition, major statistical indicators of labor market activity are released by all of the States on a monthly, quarterly, and annual basis. For information on the various labor market studies, reports, and analyses available in a specific State, contact the chief of research and analysis in the State employment security agency. Titles and addresses are as follows:

Alabama

Chief, Research and Statistics, Department of Industrial Relations, Industrial Relations Bldg., 649 Monroe St., Montgomery, Ala. 36130.

Alaska

Chief, Research and Analysis, Employment Security Division, Department of Labor, P.O. Box 3-7000, Juneau, Alaska 99811.

Arizona

Manager, Labor Market Information, Research and Analysis, Department of Economic Security, P.O. Box 6123, Phoenix, Ariz. 85005.

Arkansas

Chief, Research and Statistics, Employment Security Division, P.O. Box 2981, Little Rock, Ark. 72203.

California

Chief, Employment Data and Research Division, Employment Development Department, 800 Capitol Mall, Sacramento, Calif. 95814.

Colorado

Chief, Research and Analysis, Division of Employment, Department of Labor and Employment, 251 East 12th Ave., Denver, Colo. 80203.

Connecticut

Director, Research and Information, Connecticut Employment Security Division, 200 Folly Brook Blvd., Weatherfield, Conn. 06109.

Delaware

Chief, Office of Research, Planning, and Evaluation, Department of Labor, 801 West 14th St., Wilmington, Del. 19899.

District of Columbia

Chief, Division of Manpower Reports and Analysis, Office of Administration and Management Services, D.C. Department of Manpower, 605 G St. NW., Washington, D.C. 20001.

Florida

Director, Research and Statistics, Division of Employment Security, Florida Department of Commerce, 1720 South Gadsden St., Tallahassee, Fla. 32304.

Georgia

Director, Information Systems, Employment Security Agency, Department of Labor, 254 Washington St. SW., Atlanta, Ga. 30334.

Hawaii

Chief, Research and Statistics, Department of Labor and Industrial Relations, 825 Mililani St., Honolulu, Hawaii 96813.

Idaho

Chief, Research and-Analysis, Department of Employment, P.O. Box 35, Boise, Idaho 83707.

Illinois

Manager, Research and Analysis Division, Bureau of Employment Security, Department of Labor, 910 South Michigan Ave., Chicago, Ill. 60605.

Indiana

Chief of Research, Employment Security Division, 10 North Senate Ave., Indianapolis, Ind. 46204.

Iowa

Chief, Research and Statistics, Employment Security Commission, 1000 East Grand Ave., Des Monies, Iowa 50319.

Kansas

Chief, Research and Analysis Department, Employment Security Division, Department of Labor, 401 Topeka Ave., Topeka, Kans. 66603.

Kentucky

Director, Research and Special Projects, Department of Human Resources, State Office Building Annex, Frankfort, Ky. 40601.

Louisiana

Acting Chief, Research and Statistics, Department of Employment Security, P.O. Box 44094, Baton Rouge, La. 70804.

Maine

Director, Manpower Research Division, Employment Security Commission, 20 Union St., Augusta, Maine 04330.

Maryland

Acting Director, Research and Analysis, Department of Human Resources, 1100 North Eutaw St., Baltimore, Md. 21201.

Massachusetts

Assistant Director, Research and Information Service, Division of Employment Security, Hurley Bldg., Government Center, Boston, Mass. 02114.

Michigan

Director, Research and Statistics Division, Employment Security Commission, Department of Labor Bldg., 7310 Woodward Ave., Detroit, Mich. 48202.

Minnesota

Director, Research and Planning, Department of Employment Services, 390 North Robert St., St. Paul, Minn. 55101.

Mississippi

Chief, Research and Statistics, Employment Security Commission, P.O. Box 1699, Jackson, Miss. 39205.

Missouri

Chief, Research and Analysis, Division of Employment Security, Department of Labor and Industrial Relations, P.O. Box 59, Jefferson City, Mo. 65101.

Montana

Chief, Research and Analysis, Employment Security Division, P.O. Box 1728, Helena, Mont. 59601.

Nebraska

Chief, Research and Statistics, Division of Employment, Department of Labor, P.O. Box 94600, State House Station, Lincoln, Nebr. 68509.

Nevada

Chief, Manpower Information and Research, Employment Security Department, 500 East Third St., Carson City, Nev. 89701.

New Hampshire

Supervisor, Economic Analysis and Reports, Department of Employment Security, 32 South Main St., Concord, N.H. 03301.

New Jersey

Director, Division of Planning and Research, Department of Labor and Industry, John Fitch Plaza, Trenton, N.J. 08625.

New Mexico

Chief, Research and Statistics, Employment Security Commission, P.O. Box 1928, Albuquerque, N. Mex. 87103.

New York

Director, Division of Research and Statistics, Department of Labor, 2 World Trade Center, New York, N.Y. 10047.

North Carolina

Manager, Bureau of Employment Security Research, Employment Security Commission, P.O. Box 25903, Raleigh, N.C. 27602.

North Dakota

Chief, Reports and Analysis, Employment Security Bureau, P.O. Box 1537, Bismarck, N. Dak. 58501.

Ohio

Director, Division of Research and Statistics, Bureau of Employment Services, 145 South Front St., Columbus, Ohio 43216.

Oklahoma

Chief, Research and Planning Division, Employment Security Commission, Will Rogers Memorial Office Bldg., Oklahoma City, Okla. 73105.

Oregon

Chief, Research and Statistics, Employment Division, 875 Union St. NE., Salem, Oreg. 97310.

Pennsylvania

Assistant Director, Research and Statistics, Bureau of Employment Security, Department of Labor and Industry, 7th and Forster Sts., Harrisburg, Pa. 17121.

Puerto Rico

Chief of Research and Statistics, Bureau of Employment Security, 427 Barbosa Ave., Hato Rey, P.R. 00917.

Rhode Island

Supervisor, Employment Security Research, Department of Employment Security, 24 Mason St., Providence, R.I. 02903.

South Carolina

Director, Manpower Research and Analysis, Employment Security Commission, 1550 Gadsden St., Columbia, S.C. 29202.

South Dakota

Chief, Research and Statistics, Employment Security Department, 607 North Fourth St., Box 730, Aberdeen, S. Dak. 57401.

Tennessee

Chief, Research and Statistics, Department of Employment Security, 519 Cordell Hull Bldg., Nashville, Tenn. 37219.

Texas

Chief, Manpower Data Analysis and Research, Texas Employment Commission, TEC Bldg., 15th and Congress Ave., Austin, Tex. 78778.

Utah

Director, Reports and Analysis, Department of Employment Security, P.O. Box 11249, Salt Lake City, Utah 84111.

Vermont

Chief, Research and Statistics, Department of Employment Security, P.O. Box 488, Montpelier, Vt. 05602.

Virginia

Chief, Manpower Research, Virginia Employment Commission, P.O. Box 1358, Richmond, Va. 23211.

Washington

Chief, Research and Statistics, Employment Security Department, P.O. Box 367, Olympia, Wash. 98504.

West Virginia

Chief, Research and Statistics, Department of Employment Security, 112 California Ave., Charleston, W. Va. 25305.

Wisconsin

Director, Research and Statistics, Department of Industry, Labor and Human Relations, P.O. Box 2209, Madison, Wis. 53701.

Wyoming

Chief, Research and Analysis, Employment Security Commission, P.O. Box 2760, Casper, Wyo. 82601.

III. ASSUMPTIONS AND METHODS USED IN PREPARING EMPLOYMENT PROJECTIONS

Although the discussions of future job prospects contained in the *Occupational Outlook for College Graduates* are written in qualitative terms, the analyses upon which they are based begin with quantitative estimates of projected employment, replacement openings, and—in a few cases—supply.

These projections were developed using the most recent data available on population, industry and occupational employment, productivity, consumer expenditures, and other factors expected to affect employment. The Bureau's research offices provided much of these data, but many other agencies of the Federal Government were important contributors, including the Bureau of Apprenticeship and Training and the U.S. Employment Service, both in the Employment and Training Administration of the Department of Labor; the Bureau of the Census of the Department of Commerce; the Office of Education and the Rehabilitation Services Administration of the Department of Health, Education, and Welfare; the Veterans Administration; the Civil Service Commission; the Interstate Commerce Commission; the Civil Aeronautics Board; the Federal Communications Commission; the Department of Transportation; and the National Science Foundation.

In addition, experts in industry, unions, professional societies, and trade associations furnished data and supplied information through interviews. Many of these individuals also reviewed preliminary drafts of the statements. The information presented in each statement thus reflects the knowledge and judgment not only of the Bureau of Labor Statistics staff, but also of leaders in the fields discussed, although the Bureau, of course, takes full responsibility.

After the information from these sources was compiled, it was analyzed in conjunction with the Bureau's model of the economy in 1985. Like other models used in economic forecasting, it encompasses the major facets of the economy and represents a comprehensive view of its projected structure. The Bureau's model is comprised of internally consistent projections of gross national product (GNP) and its components—consumer expenditures, business investment, government expenditures, and net exports; industrial output and productivity; labor force; average weekly hours of work; and employment for detailed industry groups and occupations. The methods used to develop the employment projections in this publication are the same as those used in other Bureau of Labor Statistics studies of the economy. Detailed descriptions of these methods appear in *The U.S. Economy in 1985*, BLS Bulletin 1809, and the *BLS Handbook of Methods for Surveys and Studies*, Bulletin 1910.

Assumptions. The Bureau's projections to 1985 are based on the following general assumptions:

—The institutional framework of the U.S. economy will not change radically.

—Current social, technological, and scientific trends will continue, including values placed on work, education, income, and leisure.

—The economy will gradually recover from the high unemployment levels of the mid-1970's and reach full employment (defined as an unemployment rate of 4 percent) in the mid-1980's.

—No major event such as widespread or long-lasting energy shortages or war will significantly alter the industrial structure of the economy or alter the rate of economic growth.

—Trends in the occupational structure of industries will not be altered radically by changes in relative wages, technological changes, or other factors.

Methods. Beginning with population projections by age and sex developed by the Bureau of the Census, a projection of the total labor force is derived using expected labor force participation rates for each of these groups. In developing the participation rates, the Bureau takes into account a variety of factors that affect a person's decision to enter the labor force, such as school attendance, retirement practices, and family responsibilities.

The labor force projection then is translated into the level of GNP that would be produced by a fully employed labor force. Unemployed persons are subtracted from the labor force estimate and the result is multiplied by a projection of output per worker. The estimates of future output per worker are based on an analysis of trends in productivity (output per work hour) among industries and changes in the average weekly hours of work.

Next, the projection of GNP is divided among its major components: Consumer expenditures, business investment, government expenditures—Federal, State, and local—and net exports. Each of these components is broken down by producing industry. Thus, consumer expenditures, for example, are divided among industries producing goods and services such as housing, food, automobiles, medical care, and education.

Once estimates are developed for these products and services, they are translated into detailed projections of industry output, not only for the industries producing the final product, but also for the intermediate and basic industries that provide the raw materials, electric power, transportation, component parts, and other inputs required in the production process. To facilitate this translation, the Department of Commerce has developed input-output tables that indicate the amount of output from each industry—steel, glass, plastics, etc.—that is required to produce a final product, automobiles for example.

By using estimates of future output per work-hour based on studies of productivity and technological trends for each industry, industry employment projections are derived from the output estimates.

These projections are then compared with employment projections derived using regression analysis. This analysis develops equations that relate employment by industry to combinations of economic variables, such as population and income, that are considered determinants of long-run changes in employment. By comparing projections resulting from input-output analysis and regression analysis, areas may be identified where one method produces a projection inconsistent with past trends or with the Bureau's economic model. The projections are then adjusted accordingly.

Occupational employment projections. Projections of industry employment are translated into occupational employment projections using an industry-occupation matrix. This matrix, which is divided into 200 industry sectors and 400 occupation sectors, describes the current and projected occupational structure of each industry. By applying the projected occupational structure for each industry to the industry employment projection and aggregating the resulting estimates, employment projections for each of the 400 occupations contained in the matrix are obtained. The growth rate of an occupation, thus, is determined by 1) changes in the proportion of workers in the occupation to the total work force in each industry, and 2) the growth rate of industries in which an occupation is concentrated. An occupation that is projected to increase as a proportion of the work force in each industry, for example, or one that is concentrated in industries projected to grow more rapidly than the average for all industries, would be projected to grow faster than the average for all occupations.

In some cases employment is related directly to one of the components of the Bureau's model--for example, the number of physicians is related to consumer expenditures for health care. In others, employment is related to an independent variable not explicitly projected in the model, but believed to be a primary determinant of employment in that occupation. The projection of airplane pilots, for example, is based on the expected number of hours that commercial aircraft will be flown. Keep in mind that some variables can be predicted more accurately than others. For example, the size of the school-age population, which affects needs for teachers, can be estimated with a high degree of confidence because most of the people who will be attending school over the next decade have already been born. On the other hand, the level of defense spending, which affects the needs for scientists and engineers is quite difficult. Defense spending depends on government policy, which can change quickly and radically.

Projections that are developed independently are compared with those in the matrix and revised, if necessary, to assure consistency.

Replacement needs. In addition to a projection of employment for each occupation, a projection is made of the number of workers who will be needed as replacements. Separations constitute a significant source of openings. In most occupations, more workers are needed to replace those who retire, die, or leave the occupation than are needed to fill jobs created by growth. Consequently, even some declining occupations offer employment opportunities.

To estimate replacement openings, the Bureau has developed tables of working life based on actuarial experience for deaths and on decennial census data for general patterns of labor force participation by age and sex. Withdrawals from each occupation are calculated separately for men and women by age group and used to compute an overall separation rate for the occupation. These rates are used to estimate average annual replacement needs for each occupation over the projection period.

The Bureau is currently analyzing data from the 1970 Census to determine the effect of occupational transfers on job openings. These transfers have not been taken into account in calculating replacement needs. Some data on occupational transfers have been published in two *Monthly Labor Review* articles, "Occupational Mobility in the American Labor Force" and "Occupational Mobility of Health Workers," January and May 1977, respectively.

Supply. Supply estimates used in analysis of many occupations presented in this publication represent the numbers of workers who are likely to seek entry to a particular occupation if past trends of entry to the occupation continue. These estimates are developed independently of the demand estimates. Thus, supply and demand are not discussed in the usual economic sense in which wages play a major role in equating supply and demand. Statistics on college enrollments and graduations by field are the chief sources of information on the potential supply of personnel in professional, technical, and other occupations requiring extensive formal education. A Bureau publication, *Occupational Supply: Concepts and Sources of Data for Manpower Analysis* (BLS Bulletin 1816, 1974), explores several aspects of occupational supply.

Job outlook for college graduates as a whole. In addition to projecting the job outlook for many occupations sought by college graduates, the Bureau has analyzed the outlook for graduates as a whole. The analysis was done by comparing projected openings in the types of jobs requiring a college degree or usually sought by graduates with estimates of the number of graduates expected to enter the labor force.

Table 1 presents data on trends in the proportion of workers with 4 years of college or more in each of the nine major occupational groups.

Table 1. Percent of workers in major occupational groups with 4 years of college or more, selected years, 1959–76 and projected 1985

Year	All occupational groups	Professional and technical workers	Managers and administrators	Sales workers	Clerical workers	Service workers	Craft workers	Operatives	Laborers	Farm workers
1959	10.0	56.1	13.1	10.1	4.9	1.4	2.1	0.8	0.5	1.4
1962	11.5	57.5	15.5	11.7	5.8	1.5	1.6	.9	.7	1.5
1964	11.7	59.2	16.2	10.6	5.3	1.4	1.6	1.0	.8	2.2
1965	12.0	58.8	17.7	9.8	5.5	1.3	2.1	.8	.9	1.7
1966	12.1	59.1	19.6	11.3	4.8	1.1	1.7	.6	.4	1.8
1968	12.8	59.4	20.6	10.7	4.7	1.3	1.6	.7	.7	1.2
1969	12.9	59.1	20.1	11.0	4.5	1.3	2.0	.7	.6	2.2
1970	12.8	59.8	20.1	11.8	4.7	1.3	1.8	.8	.7	1.2
1971	14.1	60.2	23.5	13.3	5.0	1.8	1.9	.9	1.6	2.3
1972	14.1	60.3	25.7	15.2	5.8	2.2	2.1	1.1	1.5	2.8
1973	14.6	62.4	26.4	15.5	5.5	2.5	2.7	1.2	1.3	4.3
1974	15.5	62.9	28.0	16.5	6.5	2.9	3.1	1.5	1.4	4.8
1975	16.7	63.8	28.5	17.2	7.6	3.1	3.3	1.7	2.2	5.1
1976	17.4	64.6	28.9	18.7	8.3	3.9	3.6	1.8	2.3	7.4
Projected 1985	18.1	68.0	36.2	21.5	6.5	3.5	3.1	1.5	1.4	6.1

These trends were analyzed to determine what proportion of the jobs in each major group by 1985 would require a degree or be of the type usually sought by graduates. These proportions were applied to projections of total requirements for workers in each major occupational group to obtain projections of requirements for college graduates by major occupational group, and group totals were summed. The projected growth in jobs for college graduates, therefore, reflects both the overall growth in jobs in the economy and the increasing proportion of jobs requiring graduates.

Higher proportions of graduates are projected to be needed in professional and technical, managerial and administrative, and sales occupations, reflecting long-term trends in the increasingly sophisticated nature of many of these jobs. The increased sophistication of management techniques, the greater amount of legislation affecting administrators, and the more advanced level of technology all should contribute to the upgrading of many jobs. To some extent, however, upgrading of jobs in these groups reflects employers' responses to the greater availability of college graduates, rather than any change in the nature of the work.

The proportions of workers in the other major occupational groups—clerical, blue-collar, service, and farm—requiring a college degree were projected to be somewhat lower in 1985 than actual 1976 proportions. Employers traditionally have not sought college graduates for these kinds of jobs, and, during the 1960's when other jobs for graduates were plentiful, few graduates entered these occupations. During the 1970's, however, the proportions of graduates in these jobs increased rapidly—reflecting, for the most part, difficulty in finding more desirable jobs rather than any upgrading of job content. The projected proportions, nevertheless, are higher than those occurring during the 1960's—reflecting the greater attractiveness, and perhaps upgrading, of certain jobs in these groups such as police officers and detectives, insurance adjusters and investigators, and craft workers.

Estimates of job openings over the 1976–85 period resulting from college graduates who are expected to die, retire, or leave the labor force for other reasons were calculated by applying actuarial-type data for age and sex groups to the age and sex distribution of college graduates in the labor force.

Estimates of the number of college graduates who are expected to enter the labor force were based primarily on projections of earned bachelor's degrees developed by the National Center for Education Statistics. The average number of bachelor's degrees granted annually over the 1976–85 period is expected to be slightly higher than the number granted during the 1975–76 academic year. For detailed discussion of the method used to develop these degree projections, see *Projections of Education Statistics to 1985–86*, U.S. Department of Health, Education, and Welfare, National Center for Education Statistics, NCES 77–402. Advanced degrees were not included in the calculations since virtually all advanced degree recipients would already have a bachelor's degree and, therefore, were accounted for in the bachelor's degree calculations.

The number of persons with college degrees entering the labor force over the 1976–85 period also includes some graduates with degrees earned before 1976 who are not currently in the labor force, graduates separating from the military, and immigrants with degrees. Projections of labor force entrants and re-entrants from these sources are based on historical trends.

IV. TOMORROW'S JOBS FOR COLLEGE GRADUATES

Many questions must be considered by young persons as they attempt to match their abilities and interests with the variety of occupational choices. What fields are expected to offer good prospects for employment? What jobs require a college education? Will education beyond a bachelor's degree enhance career prospects in a particular occupation? How do earnings compare among occupations requiring similar training? What types of employers provide which kinds of jobs? Does a particular job offer steady, year-round work or is it affected by minor swings in the economy?

The answers to these questions change as our economy changes. Current information, therefore, is a necessity. This chapter explores how changes in our industrial and economic framework affect the growth of employment in specific occupations.

Employment Projections in a Changing Economy

The demand for workers in any occupation depends ultimately on the tastes and desires of consumers. If a product or service is unwanted, whether by private or public purchasers, no workers will be needed to produce or provide it. Credit managers would become unnecessary if everyone preferred to pay cash for the things they bought, as would astronauts if the Federal Government abandoned its space program.

Closely interwoven with the demand for products or services is technological innovation. In the 20th century, technology has both created and eliminated hundreds of thousands of jobs. The telephone, for example, gave birth to an entire industry at about the same time that the automobile put stable owners and carriage manufacturers out of business. Changes in the way businesses are organized and managed have had similar effects; the rise of supermarket chains has drastically reduced the number of self-employed grocers.

Fortunately, most of the factors that alter the demand for workers in various occupations do not change overnight. Shifts in the state of the economy, the introduction of new technology, and the development of new organization and management techniques generally occur in an orderly, fairly predictable fashion. Although no one can forecast the future with certainty, it is possible to make industry and occupation employment projections that are useful to educators, vocational planners, and individuals who are planning their careers. The economic and statistical analysis used by the Bureau of Labor Statistics to develop its projections is described in some detail in Chapter III.

The following assessment of industrial and occupational growth begins with a projection of the total labor force. By 1985, approximately 108.6 million persons will be in the civilian labor force. This represents a projected 15 percent increase in the labor force over the 1976–85 period.

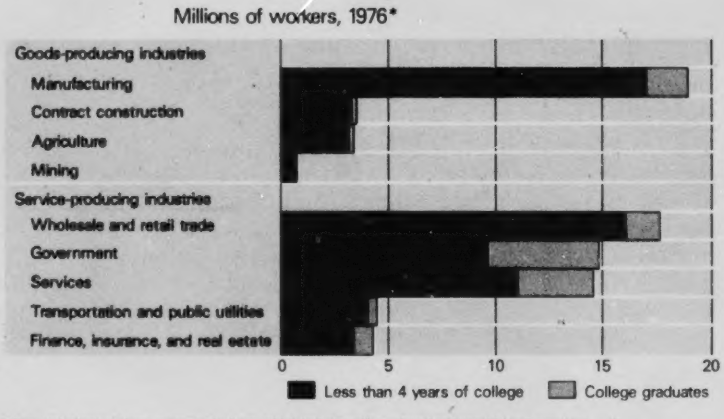
The growth of individual industries and occupations will differ, however, from that of the total labor force. The following sections discuss the projected growth of industries and occupations.

The last part of this chapter relates job openings resulting from this growth to other information about the labor market, and describes the overall employment situation that college graduates are likely to face through 1985.

Industrial Profile

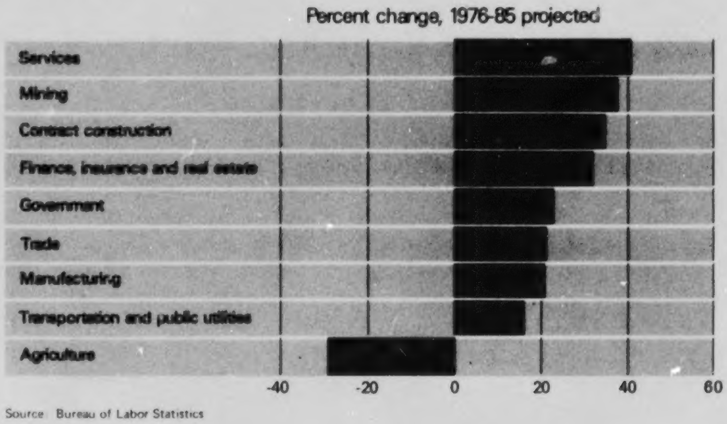
Economists customarily divide our economy into nine industry categories under two broad groups—goods producing and service producing. Most of the Nation's workers currently are employed in industries that

Where people work **1**



*Wage and salary workers, except agriculture, which includes self-employed and unpaid family workers.
Source: Bureau of Labor Statistics

Through the mid-1980's employment growth will vary widely by industry 2



Source: Bureau of Labor Statistics

provide services, such as education, health care, trade, repair and maintenance, government, transportation, banking, and insurance. The production of goods through farming, construction, mining, and manufacturing requires only about one-third of the country's work force.

Employment in the goods-producing industries has remained relatively constant since World War II, whereas the service-producing industries have expanded rapidly. Among the factors contributing to this rapid growth were the migration from rural to urban areas and the accompanying need for more local government services, and rising incomes and living standards that resulted in a demand for improved health and education services. These factors are expected to continue to cause the demand for services to grow.

Service-Producing Industries. In 1976, more than 4 out of 5 employed college graduates, about 11.7 million, were in service-producing industries. (See chart 1.) Total employment in the service-producing industries is expected to increase from 56.1 million workers in 1976 to 71.0 million in 1985, an increase of 26 percent. Of course, growth rates will vary among the industries within this group. (See chart 2.)

Trade, the largest of the service industries, is expected to grow by about 20 percent between 1976 and 1985, from 17.7 million to 21.3 million workers.

Both wholesale and retail trade have increased as population has grown and as rising incomes have enabled people to buy a greater number and variety of goods. Retail trade has grown more rapidly than wholesale trade as the expansion of the suburbs has created a demand for more shopping centers. Although self-service is expected to become more prevalent, employment in retail trade nonetheless will continue to grow faster than in wholesale trade.

In 1976, about 1 out of 10 employed college graduates, roughly 1.6 million, was in trade. Of all workers in trade, 9 percent were college graduates.

Government has been the second fastest growing service industry. Employment in State and local governments doubled between 1960 and 1976. Growth has been greatest in agencies providing education, health, sanitation, welfare, and police and fire protection. Federal Government employment has increased only 20 percent during the same period.

Government is a major area of employment for college educated workers. More than a third of employed college graduates, about 5.2 million, were in government in 1976. Of all workers in government, 35 percent were college graduates.

Between 1976 and 1985, total employment in government is expected to rise 22 percent, from 14.9 million to 18.3 million workers. This growth rate is less than that expected for services as a whole. Although State and local governments will continue to be the major source of jobs, the budget problems many local governments now face are expected to retard the expansion of some government programs. Furthermore, slow growth is expected in State and local government education employment where almost all teachers work. This will occur because of declines in the school age population, resulting in fewer students to teach.

Service industries have been the fastest growing group in the service-producing category, nearly doubling in employment between 1960 and 1976. The growing need for health care, maintenance and repair, advertising, and accounting, legal, and engineering services has been the primary force behind this growth. In 1976, one-quarter of all employed college graduates were in service industries. Of all workers in the service industries, 24 percent were college graduates.

In the future, service industries are expected to continue their rapid growth—employment is projected to increase from 14.6 million workers in 1976 to 20.6 million in 1985. This projected growth rate of 40 percent is nearly twice as rapid as that of the service-producing industries as a group. Employment requirements in health care are expected to grow rapidly due to population growth—in particular the growth in the number of elderly persons—and rising incomes that increase people's ability to pay for medical care. Business services, including accounting, data processing, and maintenance, also are expected to grow rapidly.

Transportation and public utility industries experienced a much slower growth rate between 1960 and 1976 than any of the other service-producing industries. This has largely been due to employment declines in the railroad and water transportation industries. Only about 3 percent of employed college graduates in 1976 were in transportation industries. Of all workers in these industries, about 9 percent were college graduates.

Although employment in the railroad and water transportation industries is expected to continue to decline (but at a slower rate than before), other industries in this group will experience increases. The air transportation industry, which nearly doubled in size between 1960 and 1976, will continue to grow at a moderate pace.

Between 1976 and 1985, employment in transportation and public utilities industries is expected to rise from 4.5 million to 5.2 million workers, an increase of 16 percent.

Finance, insurance, and real estate will grow faster than services as a whole. Employment is expected to increase from 4.3 million to 5.6 million workers between 1976 and 1985, an increase of 30 percent.

Within this group, the two fastest growing industries have been banking and credit agencies. Employment in banking nearly doubled between 1960 and 1976, reflecting a growing population that increasingly pays its bills by check. Employment requirements also grew as banks began to provide more services, particularly the bank credit cards, and remained open longer hours. Population growth also meant an increased demand for the services of finance companies, savings and loan associations, and other credit agencies. These trends are expected to continue through the mid-1980's.

About 7 percent of employed college graduates in 1976 were in finance, insurance, and real estate. Of all workers in these industries in 1976, about 22 percent were college graduates.

Goods-Producing Industries. In 1976, less than 1 out of 5 employed college graduates, about 2.4 million, was in the goods-producing industries. Total employment in the goods-producing industries—agriculture, mining, construction, and manufacturing—has changed very little since 1960. Significant gains in productivity resulting from automated production, improved machinery, and other technological breakthroughs have permitted large increases in output without additional workers. Between 1976 and 1985, employment in goods-producing industries is expected to increase by about 17 percent, from 26.6 million to 31.1 million workers. Growth rates will vary from industry to industry within this group.

Employment in *agriculture*, which has long been declining, stabilized at about 3.5 million workers between 1970 and 1975, but dropped again to 3.3 million in 1976. Of all workers in agriculture in 1976, about 6 percent were college graduates. Since the 1950's, the trend toward fewer but larger farms and the use of more and better machinery has reduced the need for farmers and farmworkers. So too has the development of improved hybrid crops. Recently, for example, a hybrid tomato was developed that has a harder skin and can be machine harvested.

Although employment on farms has declined, rapid mechanization combined with better fertilizers, feeds, pesticides, and hybrids have created large increases in output. The worldwide demand for food is rising rapidly as population increases, but production is expected to continue to rise without reversing the employment decline in agriculture. Between 1976 and 1985, employment is expected to drop about 29 percent, from 3.3 million to 2.3 million workers.

Mining, once declining in employment, increased abruptly between 1970 and 1976, experiencing a 26-percent growth rate during this period and matching the growth rate of the fastest growing industry group, services. Of all workers in mining in 1976, about 12 percent were college graduates.

Most of the growth in mining was a direct result of our need for additional energy. Employment in the oil and gas extraction industry rose 33 percent between 1970 and 1976, and is expected to rise another 70 percent by 1985. Coal, the most commonly used alternative energy source, has been and will continue to be in great demand.

Employment in mining is expected to grow 39 percent between 1976 and 1985, from 0.8 to 1.1 million workers.

Contract construction, which grew fairly rapidly between 1960 and 1968, stagnated between 1968 and 1976. The earlier growth, which reflected an increasing need for houses, apartment and office buildings, highways, and shopping centers, was dampened by the economic downturn that began in the late 1960's.

Buildings that had been vacant are now filling up, however, and as our economy recovers, employment in construction is expected to increase, rising by 38 percent between 1976 and 1985, or from 3.6 million to 4.9 million workers.

Of all workers in construction in 1976, about 6 percent were college graduates.

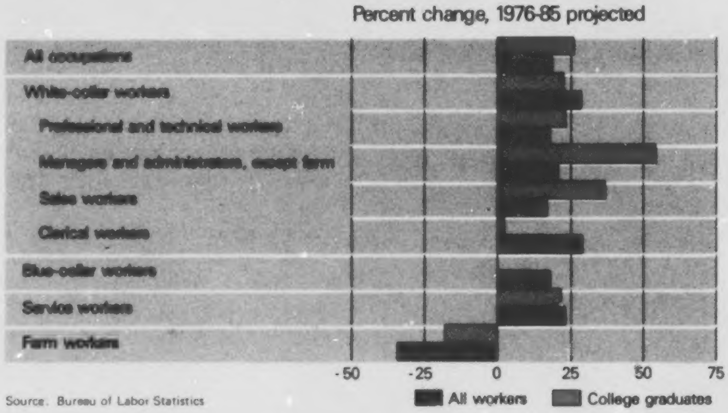
Manufacturing employment, also adversely affected by the economic conditions of the early 1970's, is expected to grow from 18.9 million to 22.8 million between 1976 and 1985, an increase of 20 percent.

In 1976, about 1 out of 8 employed college graduates was in manufacturing. Of all workers in manufacturing in 1976, about 10 percent were college graduates.

Manufacturing is divided into two broad categories, durable goods manufacturing and nondurable goods manufacturing. Employment in durable goods manufacturing is expected to increase by about 25 percent, from 11.0 million to 13.8 million workers, while employment in nondurable goods manufacturing is expected to increase by only 13 percent, from 7.9 million to 9.0 million workers.

Growth rates will vary among individual industries within each of these categories. In nondurable goods industries, for example, employment in tobacco manufacturing is expected to decline, while a moderate rise in employment is projected for the synthetic fiber industry. Among durable goods manufacturing industries, medical instrument manufacturing is expected to undergo a rapid employment increase; motor vehicle manufacturing will employ about the same

Requirements for college graduates are expected to grow faster than requirements for all workers **3**



Source: Bureau of Labor Statistics

number of workers in 1985 as it did in 1976.

Occupational Profile

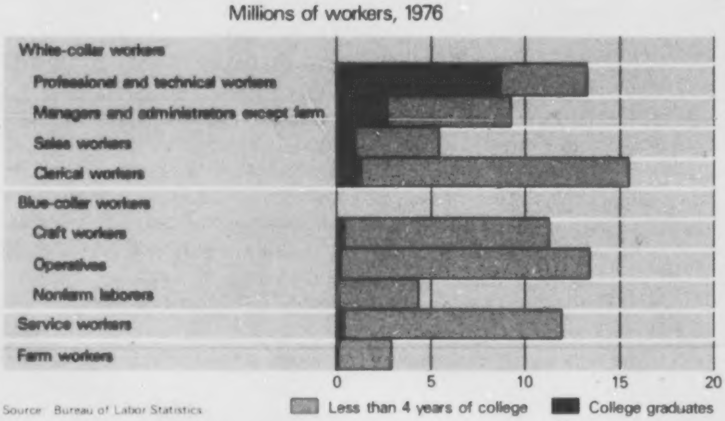
Customarily, occupations also are divided into several groups. White-collar workers are those in professional and technical, managerial, sales, and clerical jobs. Blue-collar workers are those in craft, operative, and laborer jobs. Service workers and farm workers constitute separate groups.

Once a small proportion of the total labor force, white-collar workers have steadily increased in importance until they now represent about half of the total. The number of service workers also has risen rapidly, while the blue-collar work force has grown only slowly and the number of farmworkers has declined.

Most of these changes in occupational employment have been due to variations in the growth rates of industries. Every industry group has a unique occupational pattern. Finance, insurance, and real estate, for example, employ mostly white-collar workers, while construction is predominantly a blue-collar industry group. Growth in the finance, insurance, and real estate group would result in an increase in employment of white-collar workers. The same would be true for growth in services and trade—industries that also employ large proportions of white-collar workers. The magnitude of the change would depend on both the rate of growth and the size of the industry.

The following sections describe the changes that are expected to occur among the broad occupational groups between 1976 and 1985.

Most professional and technical workers are college graduates **4**



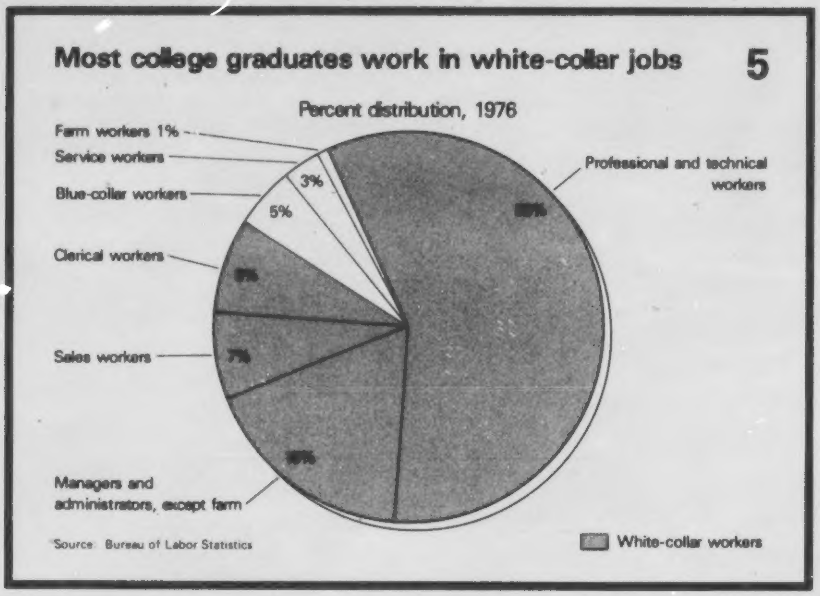
Source: Bureau of Labor Statistics

White-collar workers, who numbered 43.7 million in 1976, included more than 9 out of every 10 employed college graduates. More than 31 percent, or 13.6 million, of all white-collar jobs were filled by college graduates in 1976. By the mid–1980's, 33 percent, or 17.5 million, of the 53.5 million white-collar jobs are expected to require a college degree. Although employment requirements for college graduates are expected to increase by 28 percent, requirements in some white-collar occupations will vary greatly. (See chart 3.)

Professional and technical workers include a wide range of highly trained workers, such as scientists and engineers, medical practitioners, teachers, entertainers, pilots, and accountants. In 1976, 65 percent of the workers in this group were college graduates. (See chart 4.) Nearly 3 out of 5 employed college graduates in 1976 were in this group. (See chart 5.)

Employment of professional and technical workers is expected to grow by about 18 percent between 1976 and 1985, rising from 13.3 million to 15.8 million workers. Requirements for college graduates in this group are expected to grow by about 23 percent, from 8.7 million to 10.7 million.

Greater efforts in energy production, transportation, and environmental protection will contribute to a growing demand for scientists, engi-



Most college graduates work in white-collar jobs 5

Source: Bureau of Labor Statistics

neers, and technicians. The medical professions can be expected to grow as the health services industry expands. The demand for professional workers to develop and utilize computer resources also is projected to grow rapidly.

Some occupations will offer less favorable job prospects because the supply of workers exceeds the available openings. Teachers will continue to face competition, as will artists and entertainers, airline pilots, and oceanographers.

Managers and administrators include workers such as corporate executives, school and health services administrators, department store managers, and self-employed business operators. In 1976, nearly 30 percent of the workers in this group were college graduates. Nearly 1 out of 5 employed graduates in 1976 were in this group.

Employment of managers and administrators is expected to grow from 9.3 million to 11.3 million between 1976 and 1985, an increase of 21 percent. Requirements for college graduates are expected to increase by 54 percent, from 2.7 million to 4.1 million.

The rapidly expanding service industries are expected to offer more jobs for managers than the slowly growing manufacturing industries.

Changes in business size and organization have resulted in differing trends for self-employed and salaried managers. The number of self-employed managers will probably continue to decline as many areas of business are increasingly dominated by large corporations and chain operations. Some kinds of small establishments in the retail trade and business services industries still will provide opportunities for self-employment, however. The demand for salaried managers will continue to grow rapidly as the economy grows, and as firms increasingly depend on trained management specialists.

Sales workers are employed primarily by retail stores, manufacturing and wholesale firms, insurance companies, and real estate agencies. In 1976, 19 percent of the workers in this group were college graduates. About 7 percent of employed college graduates in 1976 were in sales jobs.

Total employment of sales workers is expected to grow from 5.5 million to 6.4 million workers, an increase of 17 percent.

Requirements for college graduates in this group are expected to grow by about 37 percent between 1976 and 1985. Much of the growth of sales workers will be due to expansion in the retail trade industry, which employs about one-half of these workers. College graduates in sales jobs, however, are concentrated in industries other than retail trade—in occupations such as insurance agents, manufacturers sales representatives, and securities sales workers, which employers generally prefer to fill with college graduates.

Clerical workers constitute both the largest and the fastest growing occupational group. Few jobs in this group require a college degree, however, and many graduates employed in clerical jobs in 1976 were likely to be in positions not requiring a degree. Less than one employed college graduate in 10 in 1976 was in this group.

Employment in clerical occupations is expected to grow about 29 percent between 1976 and 1985, rising from 15.6 million to 20.0 million workers. Because no developments which would require a college degree are expected, the proportion of jobs in this group is not expected to grow.

Blue-collar workers. Persons employed in craft, operative, and nonfarm laborer jobs are called blue-collar workers. *Craft workers* include a wide variety of highly skilled workers, such as carpenters, tool-and-die makers, instrument makers, all-round machinists, electricians, and automobile mechanics. *Operatives* are the largest blue-collar group, including workers such as assemblers, packers, truck and bus drivers, and many types of machine operators. *Laborers*, (except farm) include workers such as garbage collectors, construction laborers, freight and stock handlers, and equipment washers. In 1976, about 5 percent of employed college graduates were in blue-collar jobs.

Employment of blue-collar workers is expected to grow by about 18 percent between 1976 and 1985, rising from 29 million to 34.1 million workers. Very few blue-collar jobs require a college degree, and employment requirements for college graduates in these occupations are not expected to increase.

Service workers include a wide range of workers—firefighters, cosmetologists, and bartenders are a few examples. These workers, most of whom are employed in the service-producing industries, make up one of the fastest growing occupational groups. In 1976, only 3 percent of employed college graduates were in service jobs.

Some of the main factors that are expected to increase the need for these workers are the rising demand for medical care; the greater need for commercial cleaning and protective services; and the more frequent use of restaurants, beauty salons, and leisure services as incomes rise.

Employment of service workers is expected to increase 23 percent between 1976 and 1985, from 12.0 million to 14.8 million workers. Requirements for college graduates in this group are expected to grow at about the same rate as for all service workers.

Farm workers include farmers and farm operators, as well as farm laborers. About 1 percent of employed graduates in 1976 were in this group.

Employment of these workers has declined for decades as farm productivity has increased as a result of the trend toward fewer but larger farms, the use of more and better machinery, and the development of new feeds, fertilizers, and pesticides. Between 1976 and 1985, the number of farmworkers is expected to decline 34 percent, from 2.8 million to 1.9 million workers.

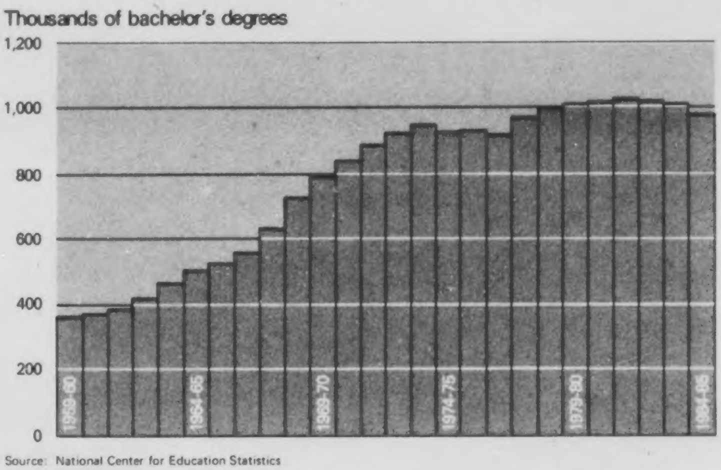
Job Openings

The rate of employment growth in an occupation is only one indicator of future job prospects; another indicator is the total number of job openings expected in the occupation. The total includes not only openings resulting from employment growth, but also those resulting from labor force separations (retirements and deaths) and transfers to other occupations.

Many job openings also are created because of occupational transfers. When a technician is upgraded to an engineer, for example, a job opening for a technician is created. Of course, this shift also adds to the supply of engineers. Data for estimating occupational losses and gains resulting from transfers are not yet available, but work is continuing towards the development of such data.

Bachelor's degrees earned 1959-60 to 1984-85

6



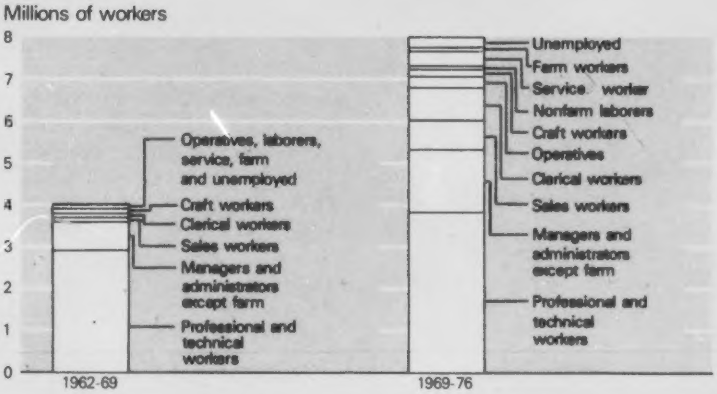
Source: National Center for Education Statistics

College Graduates: Demand and Supply, 1976–85

Throughout most of the 1960's, a college degree was considered almost a guarantee of a good job. Overall, there probably were more jobs for which employers sought graduates than there were graduates to fill them. Consequently, graduates generally had their pick of jobs and almost all graduates found the kinds of jobs they sought. The job market for college graduates, however, changed dramatically beginning about 1969, and since then, graduates have faced increasing competition for the kinds of jobs they wanted. The slowdown in the Nation's economic growth during the early and mid–1970's and a drop in the need for new teachers contributed, in part, to this turnaround. However, the principal reason for the competition faced by college graduates has been the sharp increase in the number of graduates seeking jobs. This

Jobs entered by college graduates 1962-69 and 1969-76, by major occupational group

7



increase has come about because of sharp increases in the number of bachelor's degrees granted (chart 6), as well as because higher proportions of college graduates are seeking jobs. For example, between March 1966 and March 1976, the proportion of all college graduates age 25 to 34 not in military service who were employed or looking for work increased from 79 to 85 percent.

It is estimated that about twice as many college graduates entered the labor market between 1969 and 1976 as entered during the previous 7-year period. (See chart 7.) But because there have not been enough openings in the kinds of jobs sought by graduates to absorb all job seekers, more and more graduates have been forced to enter jobs of the type not traditionally sought. Chart 7 compares the kinds of jobs entered by graduates between 1962 and 1969 and between 1969 and 1976.

Of the roughly 4 million new entrants between 1962 and 1969, about 73 percent entered professional and technical occupations. This grouping includes accountants, engineers, doctors, lawyers, teachers, and others in which a college degree usually is required. About 17 percent entered managerial and administrative occupations, another major occupational area generally felt by graduates to be appropriate for their education and abilities. Another 3 percent entered sales jobs; most probably in the better paying sales jobs, such as securities sales workers and manufacturers sales representatives. Less than 6 percent entered clerical, blue-collar, service and farm occupations.

Between 1969 and 1976 an estimated 8 million college graduates entered the labor force. More graduates entered professional and technical occupations than had entered over the previous 7 years, but because there were so many more graduates competing for available positions, those finding professional and technical jobs represented a much smaller percent of the total, only about 46 percent. About 19 percent entered managerial jobs and another 8 percent entered sales jobs. About 25 percent of the graduates spilled over into many occupations not previously sought by or filled by graduates—clerical, service, blue-collar and farm occupations, and to some extent managerial and sales occupations. Most of the increasing proportions entering managerial and sales jobs probably represents upgrading. Upgrading occurs as jobs become more complex and therefore require people with more education. For example, as managerial and sales jobs previously filled by nongraduates require an understanding of more complex government regulations and more sophisticated accounting and inventory procedures, employers may decide that a college graduate is now needed for the jobs. The great majority of graduates who took clerical, service, blue-collar, and farm jobs over the 1969–76 period, however, did not enter upgraded positions.

In addition to a spilling over into nontraditional occupations, graduates also have experienced higher rates of unemployment. From early 1969 to early 1976, the unemployment rate for all graduates increased from less than 1 percent to 2.4 percent, and for graduates 20 to 24 years old, from 2.4 percent to 6.1 percent. Although some of this increase can be attributed to generally poor economic conditions, the rise in the rate of unemployment of college graduates reflects mostly an oversupply of graduates. Young graduates still fared much better than young high school graduates, however, who had an unemployment rate of 14.1 percent. The difference in rates indicates, for the most part, that graduates have been able to outbid nongraduates for jobs rather than remain unemployed.

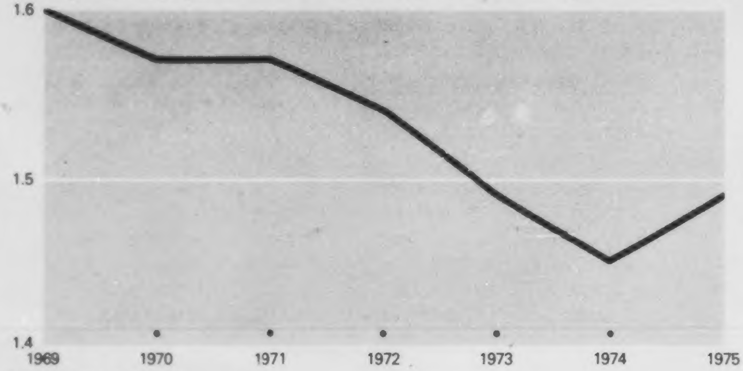
Overall, it is estimated that about 1 out of 4 graduates who entered the labor force over the 1969 to 1976 period had to take the kind of jobs not sought by or filled by graduates in better times, or were unemployed.

The increased competition among graduates for jobs has also had an adverse effect on their earnings. While average salaries of newly hired graduates have increased since 1969, earnings of nongraduates have increased more rapidly. As a result, the premium paid to college graduates has declined (chart 8). Part of this decline is due to the fact that competition for entry level positions in fields traditionally sought by graduates—such as accounting, law, teaching, and engineering has kept salaries down. Another is that a number of graduates have been forced to accept lower paying jobs not filled by graduates in the past.

College graduates entering the labor force through the mid–1980's are

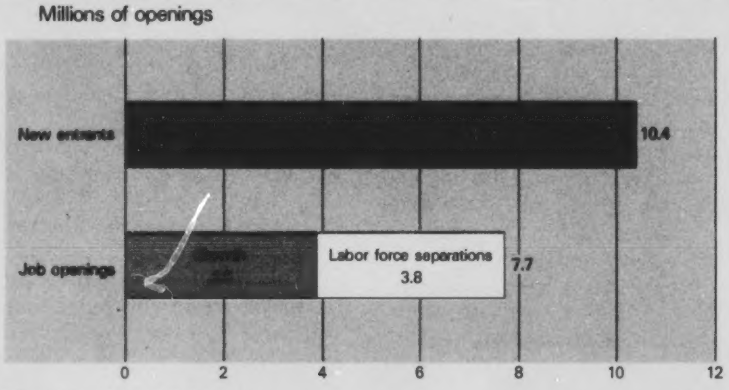
Earnings of college graduates have declined relative to earnings of high school graduates **8**

Earnings of college graduates divided by earnings of high school graduates, 1969-75



Source: Bureau of the Census

College graduates entering the labor force are expected to exceed openings in jobs traditionally filled by graduates by 2.7 million between 1976 and 1985 **9**



Source: Bureau of Labor Statistics

likely to face job market conditions very similar to those faced by graduates during the early and mid–1970's. The number of labor force entrants having a college degree is expected to continue to exceed openings in the types of jobs traditionally sought by graduates. About 3 graduates out of 4 are expected to continue to find the kinds of jobs sought by graduates, but about 1 graduate in 4 will have to enter nontraditional occupations or face unemployment.

It is estimated that about 10.4 million college graduates will enter the labor force over the 1976–85 period, but only about 7.7 million job openings in traditional jobs for college graduates are expected. (See chart 9.) About half are projected to result from growth in the kinds of jobs filled by graduates in the past and from upgrading of jobs, and half to replace graduates who retire, die, or leave the labor force for other reasons.

Like graduates in the early and mid-1970's, future graduates may have to work harder at finding jobs and may be less likely to find jobs in the occupation of their choice than were graduates during the 1960's. Many may continue to experience periods of unemployment, or move from job to job in an attempt to find employment that fits their abilities and expectations. A substantial number may continue to compete with nongraduates for the more desirable jobs not previously filled by graduates. As in the past, college graduates will have an advantage over those with less education in most jobs. However, they may face competition in some fields from junior and community college graduates who have learned job related skills. In others, such as high paying sales jobs, proven sales ability may be more valued by employers than a degree. Graduates who are least well prepared for the job market or most unlucky will clearly face the prospect of underutilization of their skills and job dissatisfaction. As in the early and mid-1970's, however, almost all will probably be able to find a job, and few should face sustained unemployment.

While it is difficult to describe the employment outlook for college graduates optimistically, the situation should not be characterized as bleak. Job satisfaction depends upon a number of factors that are difficult to analyze, and it is not possible to classify all jobs as being appropriate or not appropriate for graduates. The fact that an occupation has not traditionally been sought by college graduates does not necessarily mean that graduates will be dissatisfied with it. Many high paying jobs with substantial responsibility have been filled primarily by non-college graduates in the past, and graduates can be expected to move into these in greater numbers. Graduates who enter clerical, sales, and blue-collar jobs may be able to prove their abilities once on the job and be promoted. Some graduates who may take jobs as clerks should eventually be able to move into administrative positions, and those in craft and service-worker jobs are likely to be able to advance more quickly within their organization, or start their own businesses.

Finding a job directly related to one's major field of study in college is probably not necessary for job satisfaction. A study of college graduates found that most liberal arts graduates—those whose college majors were in fields such as English, history, and psychology—working as business administrators were generally quite happy with their jobs.[1] It is likely that business administration, like many other jobs, permits graduates to use the writing, analytical, and interpersonal skills developed by all graduates, regardless of major. If graduates feel they are using those skills, they are likely to be satisfied with their jobs. Another finding of the study was that a substantial proportion of graduates who were working in jobs they considered nonprofessional, perhaps not fully utilizing these skills, were nevertheless satified. Ideas about what constitutes an appropriate job for graduates are changing. More and more graduates see jobs as craft workers, farmers, and self-employed retail store managers, those associated with "alternative life styles," as more desirable than the traditional jobs chosen by graduates. This shift in attitudes has tended to ease the problems of underemployment and job dissatisfaction for many college graduates.

It should be pointed out that the number of people actually obtaining degrees and entering the labor force may be lower than that projected in this article. A higher proportion of high school graduates, aware of the plight of college graduates, may decide not to attend a 4-year college.

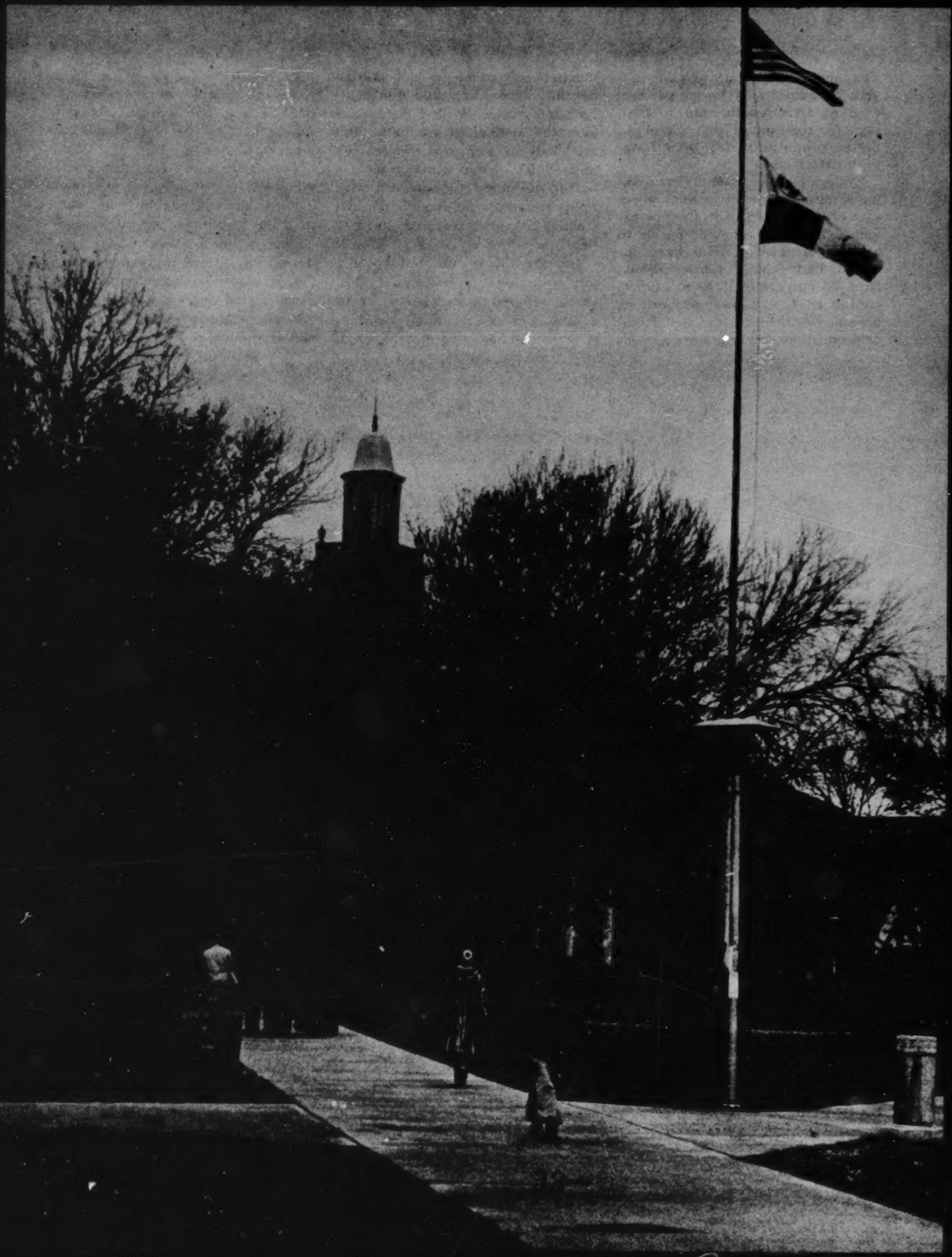
[1] (Job Satisfaction After College. . . The Graduates Viewpoint, The CPC Foundation, 1977. The study is a followup of people who were freshmen in 1961, whose highest degree held was a bachelor's degree, and who were working full time. It was conducted between November 1974 and March 1975).

They may decide that attending a 2-year community or junior college, entering an apprenticeship, or finding a job right out of high school is a better preparation for their long-term career goals.

College enrollees already are making some adjustments in their selection of major field of study. For example, the proportions preparing to enter overcrowded fields have declined. In teaching, it has declined from 20 percent in 1970 to 11 percent in 1976, and lower proportions are studying liberal arts as well. Higher proportions are obtaining degrees in career related majors such as engineering, accounting, and public affairs and service. While this does not alter the number of graduates who are likely to seek jobs through the mid-1980's, it may make graduates better equipped to compete with nongraduates who have technical training or work experience in these fields.

Despite the overall unfavorable job outlook for college graduates, those prepared to enter certain occupations such as accountant, bank officer, computer programmer, engineer, and physician are expected to have good employment opportunities. Even in overcrowded occupations, many of the better qualified graduates will find jobs.

Knowledge about prospective employment opportunities in various occupations can enable individuals to make a more informed decision about whether to attend college, and if they do choose to attend, what field to study. The following chapter discusses the outlook for more than 100 occupations usually sought by college graduates.



V. OCCUPATIONS

ACCOUNTANTS

(D.O.T. 160.188)

Nature of the Work

Managers must have up-to-date financial information to make important decisions. Accountants prepare and analyze financial reports that furnish this kind of information.

Three major accounting fields are public, management, and government accounting. Public accountants have their own businesses or work for accounting firms. Management accountants, also called industrial or private accountants, handle the financial records of the company they work for. Government accountants examine the records of government agencies and audit private businesses and individuals whose dealings are subject to government regulations.

Accountants often concentrate on one particular phase of accounting. For example, many public accountants specialize in auditing (reviewing a client's financial records and reports to judge their reliability). Others specialize in tax matters, such as preparing income tax forms and advising their clients of the advantages and disadvantages of certain business decisions. Still others become specialists in management consulting and give advice on a variety of matters. They might develop or revise an accounting system to serve the needs of clients more effectively or give advice about different types of accounting equipment.

Management accountants provide the financial information executives need to make sound business decisions. They may choose to work in areas such as taxation, budgeting, or investments. Internal auditing is an area of specialization within management accounting that is rapidly growing in importance. Accountants who work as internal auditors examine and evaluate their firm's financial systems and management control procedures to ensure efficient and economical operation.

Many accountants in the Federal Government work as Internal Revenue agents, investigators, and bank examiners; other government accountants have regular accounting positions.

Places of Employment

About 865,000 people worked as accountants in 1976. Almost 20 percent were Certified Public Accountants (CPA's) and nearly 12 percent were Certified Internal Auditors (CIA's).

About 60 percent of all accountants do management accounting work; one-fifth of these work as internal auditors. An additional 25 percent are engaged in public accounting as proprietors, partners, or employees of independent accounting firms. Other accountants work for Federal, State, and local government agencies, and a small number teach in colleges and universities. Opportunities are plentiful for part-time work in accounting, particularly in smaller firms.

Accountants are found in all business, industrial, and government organizations. Most, however, work in large urban areas where many public accounting firms and central offices of large businesses are concentrated. For example, over 20 percent of all accountants are employed in just four major cities: Chicago; Los Angeles; New York; and Washington, D.C.

Training, Other Qualifications, and Advancement

Training in accounting is available at colleges and universities, accounting and business schools, and correspondence schools. Although many graduates of business and correspondence schools are successful in small firms, most large public accounting and business firms require applicants for accountant and internal auditor positions to have at least a bachelor's degree in accounting or a closely related field. Many employers prefer those with the master's degree in accounting. A growing number of large employers prefer applicants who are familiar with computer technology for both accounting and internal auditor positions. For beginning accounting positions, the Federal Government requires 4 years of college training (including 24 semester hours in accounting) or an equivalent combination of education and experience. For teaching positions, most colleges and universities require at least the master's degree or the Certified Public Accountancy Certificate.

Previous work experience in accounting can help an applicant get a job. Many colleges offer students an opportunity to gain experience through internship programs conducted by public accounting or business firms.

Anyone working as a "certified public accountant" must hold a certificate issued by the State board of accountancy. All states use the CPA examination, prepared by the American Institute of Certified Public Accountants, to establish certification. Most successful candidates have college degrees, and three-fourths of the States require CPA candidates to be college graduates. Nearly all States require applicants to have at least 2 years of public accounting experience for a CPA certificate.

Requirements vary, but more than half the States restrict the title "public accountant" to those who are licensed or registered. Some States

Traveling auditor reviewing financial records at a company plant.

require only a high school diploma while others require 2 years of college or more. Information on requirements may be obtained directly from individual State boards of accountancy or from the National Society of Public Accountants.

The recognized mark of competence and experience in the field of internal auditing is the designation, Certified Internal Auditor (CIA). The Institute of Internal Auditors, Inc., confers this designation upon candidates who have completed 3 years' experience in internal auditing and who have passed a four-part examination. Beginning in 1978, a bachelor's degree from an accredited college or university also will be required.

Persons planning a career in accounting should have an aptitude for mathematics. Neatness and accuracy also are necessary. Employers seek applicants who can handle responsibility and work with little supervision.

To get to the top in the profession, accountants usually must continue their study of accounting even though they already have a college degree or professional certificates. They may participate in seminars sponsored by various professional associations or take courses offered by their employers. A growing number of States require both CPA's and licensed public accountants to complete a certain number of hours of continuing education courses before their licenses can be renewed. An increasing number of accountants study computer operation and programming to adapt accounting procedures to new data processing methods. Although capable accountants should advance rapidly, those having inadequate academic preparation may be assigned routine jobs and find promotion difficult.

Junior public accountants usually start by assisting with auditing work for several clients. They may advance to intermediate positions with more responsibility in 1 or 2 years and to senior positions within another few years. In larger firms, those who deal successfully with top industry executives often become supervisors, managers, or partners, or transfer to executive positions in private firms. Some open their own public accounting offices.

Beginning management accountants often start as ledger accountants, junior internal auditors, or as trainees for technical accounting positions. They may advance to jobs such as chief plant accountant, chief cost accountant, budget director, or manager of internal auditing. Some become controllers, treasurers, financial vice-presidents, or corporation presidents. In the Federal Government, beginners are hired as trainees and usually are promoted in a year or so. In college and university teaching, those having minimum training and experience may receive the rank of instructor without tenure; advancement and permanent faculty status depend upon further education and teaching experience.

Employment Outlook

Employment is expected to increase about as fast as the average for all occupations through the mid-1980's as businesses and government agencies continue to expand in size and complexity. In addition to jobs resulting from growth, many thousands of openings will result each year when workers die, retire, or leave the occupation.

Demand for skilled accountants will rise as managers rely more on accounting information to make business decisions. For example, officers of large corporations base their decisions concerning proposals such as plant expansion, mergers, or foreign investments on information about the financial condition of the firm, tax implications of the proposed action, and other considerations. On a smaller scale, owners of small businesses are expected to rely more and more on the expertise of public accountants in planning their operations. Government legislation to monitor business activity also is expected to add to the demand for accountants. An example is the Pension Reform Act of 1974, which establishes minimum standards for private pension plans. This and other legislation should create many new jobs for management accountants to maintain new systems and public accountants to audit them.

Because of the growing complexity of business, college graduates will be in greater demand than applicants who lack this training. Many employers prefer graduates who have worked part time in a business or accounting firm while in school. Those who have been trained in a specific phase of accounting should find ample opportunities.

As data processing systems continue to replace manual preparation of accounting records and statements, the need for some accountants to perform routine tasks, particularly in large firms, may be reduced. However, many opportunities will arise for accountants without a college degree, mainly in small businesses and public accounting firms.

Earnings and Working Conditions

Starting salaries of beginning accountants in private industry were $11,500 a year in 1976, according to a survey in urban areas. Earnings of experienced accountants ranged between $15,400 and $23,400, depending on their level of responsibility and the complexity of the accounting system. In general, experienced accountants earn about twice as much as nonsupervisory workers in private industry, except farming. Chief accountants who direct the accounting program of a company or one of its establishments earned between $20,500 and $33,900, depending upon the scope of their authority and size of professional staff.

According to the same survey, beginning auditors averaged $11,800 a year in 1976, while experienced auditors' earnings ranged between $16,100 and $20,000.

In the Federal Civil Service, the entrance salary for junior accountants and auditors was about $9,300 in 1977. Candidates who had a superior academic record received a starting salary of about $11,500. Applicants with a master's degree or 2 years' professional experience began at about $14,100. Accountants in the Federal Government averaged about $21,800 a year in 1977.

Accountants who specialize in income tax preparation work long hours under heavy pressure during the tax season; those employed by national accounting firms may travel extensively to conduct audits and perform other services for their clients. The majority, however, work in one office between 35 and 40 hours a week, under the same general conditions as fellow office workers.

Sources of Additional Information

Information about CPA's and about aptitude tests in high schools, colleges, and public accounting firms may be obtained from:

American Institute of Certified Public Accountants, 1211 Avenue of the Americas, New York, N.Y. 10036.

Further information on specialized fields of accounting is available from:

National Association of Accountants, 919 Third Ave., New York, N.Y. 10022.

National Society of Public Accountants, 1717 Pennsylvania Ave. NW., Washington, D.C. 20006.

Institute of Internal Auditors, 249 Maitland Ave., Altamonte Springs, Fla. 32701.

ACTORS AND ACTRESSES

(D.O.T. 150.028 and 150.048)

Nature of the Work

Making a character come to life before an audience is a job that has great glamour and fascination. This demanding work requires special talent and involves many difficulties and uncertanties.

Only a few actors and actresses achieve recognition as stars on the stage, in motion pictures, or on television or radio. A somewhat larger number are well-known, experienced performers, who frequently are cast in supporting roles. However, most actors and actresses struggle for a toehold in the profession, and are glad to pick up parts wherever they can.

New stage actors generally start in "bit" parts where they speak only a few lines. If successful, they may progress to larger, supporting roles. They also may serve as understudies for the principals. Film and television actors, in contrast, may begin in large roles or move into programs from working in commercials.

Actors who prepare for stage, screen, and television roles rehearse many hours. They must memorize their lines and know their cues.

In addition to the actors and actresses with speaking parts, "extras," who have no lines to deliver, are used in various ways in almost all motion pictures and many television shows and theatre productions. In "spectacular" productions, a large number of extras take part in crowd scenes.

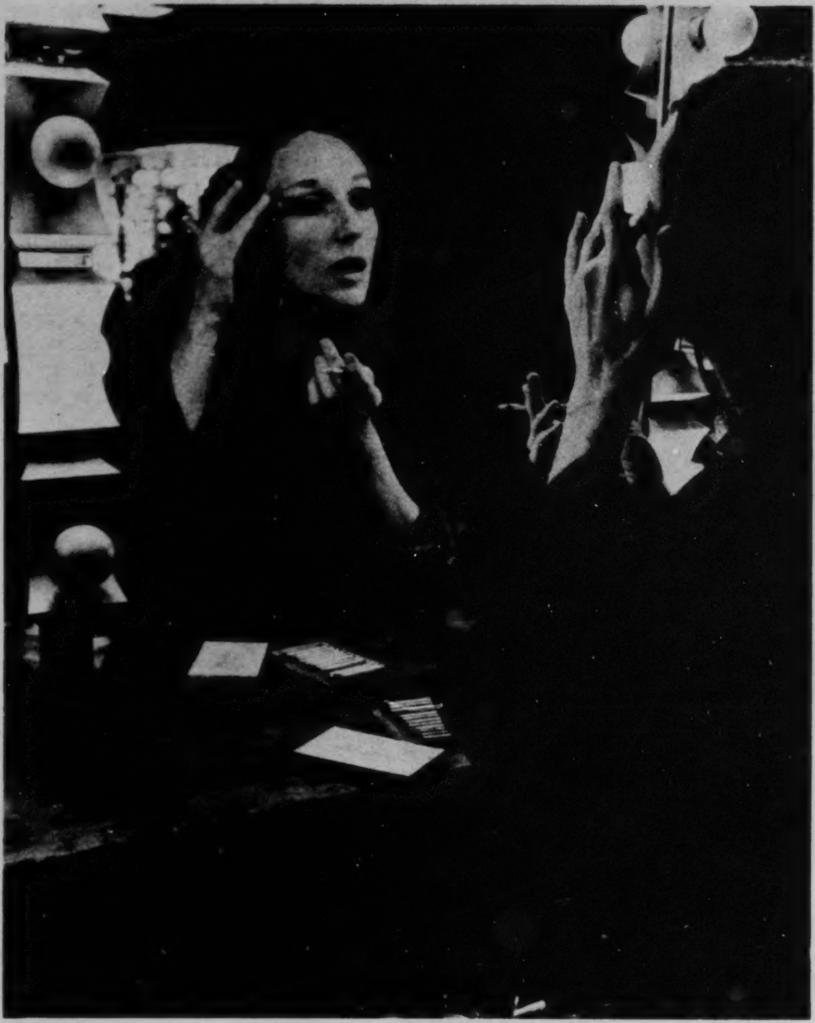
Some actors find alternative jobs as coaches of drama or directors of stage, television, radio, or motion picture productions. A few teach in drama departments of colleges and universities.

Places of Employment

About 13,000 actors and actresses worked in stage plays, motion pictures (including films made especially for television), industrial shows, and commercials in 1976.

In the winter, most employment opportunities on the stage are in New York and other large cities. In the summer, stock companies in suburban and resort areas provide employment. In addition, many cities have "little theatres," repertory companies, and dinner theatres, which provide opportunities for local talent as well as for professional actors and actresses. Normally, plays are produced and casts are selected in New York City for shows that go "on the road."

Employment in motion pictures and film television is essentially centered in Hollywood and New York City, although a few studios are located in Miami and other parts of the country. In addition, many films are shot on location, and employ local professionals and nonprofessionals as "day players" and "extras." A number of American-produced films are being shot in foreign countries. In television, most opportunities for actors are at the headquarters of the major networks—in New York, Los Angeles, and, to a lesser extent, Chicago. A few local television stations occasionally employ actors.



Acting demands patience and total commitment.

Training and Other Qualifications

Young persons who aspire to acting careers should take part in high school and college plays, or work with little theatres and other acting groups for experience.

Formal training in acting, which is increasingly necessary, can be obtained at dramatic art schools, located chiefly in New York, and in hundreds of colleges and universities throughout the country. About 760 colleges and universities confer bachelor's or higher degrees on students who major in dramatic and theater arts. College drama curriculums usually include courses in liberal arts, speech, pantomime, directing, playwriting, play production, and history of the drama, as well as practical courses in acting. From these, the student develops an appreciation of the great plays and a greater understanding of the roles he or she may be called on to play. Graduate degrees in fine arts or drama are needed for college teaching positions.

Acting demands patience and total commitment, since aspiring actors and actresses must wait for parts or filming schedules, work long hours, and often do much traveling. Flawless performances require the tedious memorizing of lines, which sometimes involves long rehearsal schedules. Other performances, such as television programs, often allow little time for rehearsal, so that the actor must deliver a good performance with very little preparation. The actor needs stamina to withstand the heat of stage or studio lights, or the adverse weather conditions that may exist "on location." Above all, persons who plan to pursue an acting career must have talent and the creative ability to portray different characters. They must have poise, stage presence, and aggressiveness to project themselves to the audience. At the same time, the ability to follow directions is important.

In all media, the best way to start is to use local opportunities and to build on the basis of such experience.

Many actors who are successful in local productions eventually try to appear on the New York stage. Modeling experience may also be helpful in obtaining employment in television or motion pictures.

To become a movie extra, one must usually be listed by Central Casting, a no-fee agency that works with the Screen Extras Guild and supplies all extras to the major movie studios in Hollywood. Applicants are accepted only when the number of persons of a particular type on the list—for example, athletic young men, old ladies, or small children—is below the foreseeable need. In recent years, only a very small proportion of the total number of applicants have succeeded in being listed. An actor employed as an extra in a film has very little opportunity to advance to a speaking role in that film.

The length of an actor's or actress's working life depends largely on skill and versatility. Great actors and actresses can work almost indefinitely. On the other hand, employment becomes increasingly limited by middle age, especially for those who become typed in romantic, youthful roles. Due to the factors discussed, persons who intend to pursue an acting career may find unstable employment conditions and financial pressures.

Employment Outlook

Overcrowding has existed in the acting field for many years, and this condition is expected to persist. In the legitimate theater, motion pictures, radio, and television, job applicants greatly exceed the jobs available. Moreover, many actors and actresses are employed in their profession for only a part of the year.

Motion pictures and TV have greatly reduced employment opportunities for actors in the theater. Although a motion picture production may use a very large number of actors during filming, films are widely distributed and may be used for years. Also, some American-produced films are shot in foreign countries, resulting in reduced employment opportunites for American actors and actresses. Television employs a large number of actors on TV programs and commercials. However, employment in this media has been reduced by the FCC ruling that decreased major TV network prime time programming. Local stations often substitute with reruns or with low cost game shows that employ few actors. Also, the trend toward 1- to 2-hour programs and more reruns shortens the period of employment and reduces the number of persons needed.

One possibility for future growth in the legitimate theater lies in the establishment of year-round professional acting companies in cities. The number of such acting groups is growing. The recent growth of summer and winter stock companies, outdoor and regional theatre, repertory companies, and dinner theaters also has increased employment opportunities. In addition, some increases may be likely in the employment of actors on television in response to expansion of the Public Broadcasting System, UHF stations, and cable TV. The development and wider use of video cassettes also may result in some employment opportunities. These media will have a positive influence on employment only if original material and programs result, not reruns or old movies.

Though the field of acting as a whole is expected to grow about as fast as the average for all occupations through the mid-1980's, the number of persons seeking to enter the profession is expected to far exceed available openings. Even highly talented young people are likely to face stiff competition and economic difficulties.

Earnings and Working Conditions

Actors and actresses in the legitimate theater belong to the Actors' Equity Association; in motion pictures, including television films, to the Screen Actors Guild, Inc., or to the Screen Extras Guild, Inc.; in television or radio, to the American Federation of Television and Radio Artists (AFTRA). These unions and the show producers sign basic collective bargaining agreements which set minimum salaries, hours of work, and other conditions of employment. Each actor also signs a separate contract, which may provide for higher salaries than those specified in the basic agreement.

The minimum weekly salary for actors in Broadway productions was about $285 in 1976. Those in small "off-Broadway" theaters received a minimum of $175 a week. For shows on the road, the minimum rate was about $395 a week. (All minimum salaries are adjusted upward automatically, by union contract, commensurate with increases in the cost of living as reflected in the Bureau of Labor Statistics Consumer Price Index.)

In 1976, motion picture and television actors and actresses earned a minimum daily rate of $172.50, or $604 for a 5-day week. For extras, the minimum rate was $52.50 a day. Actors and actresses who did not work on prime time network television received a minimum program fee of about $232.50 for a single program and 8 hours of rehearsal time. Television actors also receive additional compensation for reruns.

However, annual earnings of actors and actresses are adversely affected by the frequent periods of unemployment experienced by many. According to recent surveys by the Actors' Equity Association (which represents actors who work on the stage) and the Screen Actors Guild, almost three quarters of their members earned $2,500 or less a year from acting jobs, and only about 3 percent earned over $25,000 from such work. Because of the frequent periods of unemployment characteristic of this profession, many actors must supplement their incomes by maintaining other, non-acting jobs.

In all fields, many well-known actors and actresses have salary rates above the minimums. Salaries of the few top stars are many times the figures cited.

Eight performances amount to a week's work on the legitimate stage, and any additional performances are paid for as overtime. After the show opens, the basic workweek is 36 hours, including 12 hours for rehearsals. Before it opens, however, the workweek usually is longer to allow time for rehearsals. Evening work is, of course, a regular part of a stage actor's life. Rehearsals may be held late at night and on weekends and holidays. When plays are on the road, weekend traveling often is necessary.

Most actors are covered by a union health, welfare and pension fund, including hospitalization insurance, to which employers contribute. Under some employment conditions, Equity and AFTRA members have paid vacations and sick leave. Most stage actors get little if any unemployment compensation solely from acting since they seldom have enough employment in any State to meet the eligibility requirements. Consequently, when they are between acting jobs they often have to take any casual work they can find.

Sources of Additional Information

Information on colleges and universities and conservatories that offer a major in drama is available from:

American Theater Association, 1029 Vermont Ave., NW., Suite 402, Washington, D.C. 20005.

ACTUARIES

(D.O.T. 020.188)

Nature of the Work

Why do young persons pay more for automobile insurance than older persons? How much should an insurance policy cost? Answers to these and similar questions are provided by actuaries who design insurance and pension plans that can be maintained on a sound financial basis. They assemble and analyze statistics to calculate probabilities of death, sickness, injury, disability, unemployment, retirement, and property loss from accident, theft, fire, and other potential hazards. Actuaries use this information to determine the expected insured loss. For example, they may calculate how many persons who are 21 years old today can be expected to live to age 65—the probability that an insured person might die during this period is a risk to the company. They then calculate a price for assuming this risk that will be profitable to the company yet be competitive with other insurance companies. Finally, they must make sure that the price charged for the insurance will enable the company to pay all claims and expenses as they occur. In the same manner, the actuary calculates premium rates and determines policy contract provisions for each type of insurance offered. Most actuaries specialize in either life and health insurance or property and liability (casualty) insurance; a growing number specialize in pension plans.

To perform their duties effectively, actuaries must keep informed about general economic and social trends, and legislative, health, and other developments that may affect insurance practices. Because of their broad knowledge of insurance, company actuaries may work on problems arising in their company's investment, group underwriting, or pension planning departments. Actuaries in executive positions help determine general company policy. In that role, they may be called upon to explain complex technical matters to company executives, government officials, policyholders, and the public. They may testify before public agencies on proposed legislation affecting the insurance business, for example, or explain intended changes in premium rates or contract provisions.

Actuaries who work for the Federal Government usually deal with a particular insurance or pension program, such as social security or life insurance for veterans and members of the Armed Forces. Actuaries in State government positions regulate insurance companies, supervise the operations of State retirement or pension systems, and work on problems connected with unemployment insurance or workers' compensation. Consulting actuaries set up pension and welfare plans for private companies, unions, and government agencies. They calculate future benefits and determine the amount of the annual employer contribution. Actuaries who are enrolled under the provisions of the Employee Retirement Income Security Act of 1974 (ERISA) evaluate these pension plans and submit reports certifying their financial soundness.

Places of Employment

Approximately 9,000 persons worked as actuaries in 1976. Four of every 10 actuaries worked in five major cities—New York, Hartford, Chicago, Philadelphia, and Boston.

About two-thirds of all actuaries worked for private insurance companies. Almost 90 percent of these

Employment of actuaries is influenced by the volume of insurance sales.

worked for life insurance companies; the rest worked for property and liability (casualty) companies. The number of actuaries employed by an insurance company depends on the volume of its business and the number and types of insurance policies it offers. Large companies may employ over 100 actuaries on their staffs; others, generally smaller companies, may rely instead on consulting firms or rating bureaus (associations that supply actuarial data to member companies).

Consulting firms and rating bureaus employ about one-fifth of all actuaries. Other actuaries work for private organizations administering independent pension and welfare plans or for Federal and State government agencies. A few teach in colleges and universities.

Training, Other Qualifications, and Advancement

A good educational background for a beginning job in a large life or casualty company is a bachelor's degree with a major in mathematics or statistics; a degree in actuarial science is even better. Some companies hire applicants with a major in engineering, economics, or business administration, provided they demonstrate a thorough foundation in calculus, probability, and statistics (20-25 hours). Other desirable courses are insurance law, economics, and accounting. Although only 25 colleges and universities offer a degree in actuarial science, several hundred schools offer a degree in mathematics or statistics.

A strong background in mathematics is essential for persons interested in a career as an actuary. Of equal importance, however, is the need to pass while in school one or more of the examinations offered by professional societies. Three societies sponsor programs leading to full professional status in their specialty. The Society of Actuaries gives 9 actuarial examinations for the life and health insurance and pension field, the Casualty Actuarial Society gives 10 examinations for the property and liability field, and the American Society of Pension Actuaries gives nine examinations covering the pension field. Because the first parts of the examination series of each society cover similar materials, students need not commit themselves to a career specialty until they have taken about four examinations. Success in passing the first few examinations helps students evaluate their potential as actuaries. Those who pass these examinations usually have better opportunities for employment and receive a higher starting salary.

Actuaries are encouraged to complete an entire series of examinations as soon as possible. It generally takes from 5 to 10 years to complete the series required for full professional status. Examinations are given twice each year. Extensive home study is required in order to pass the advanced examinations; many actuaries spend as much as 20-25 hours a week studying. Actuaries who complete five examinations in either the life insurance series or the pension series or seven examinations in the casualty series are awarded "associate" membership in their respective society. Those who have passed an entire series receive full membership and the title "fellow."

Consulting pension actuaries who service private pension plans and certify their solvency must be enrolled by the Joint Board for the Enrollment of Actuaries. Applicants for enrollment must meet certain experience and education requirements as stipulated by the Joint Board.

Beginning actuaries often rotate among different jobs to learn various actuarial operations and to become familiar with different phases of insurance work. At first, their work may be rather routine, such as preparing calculations or tabulations for actuarial tables or reports. As they gain experience, they may supervise actuarial clerks, prepare correspondence and reports, and do research.

Advancement to more responsible work as assistant, associate, and chief actuary depends largely on job performance and the number of actuarial examinations passed. Many actuaries, because of their broad knowledge of insurance and related fields, are selected for administrative positions in other company activities, particularly in underwriting, accounting, or data processing departments. Many actuaries advance to top executive positions.

Employment Outlook

Employment of actuaries is expected to rise faster than the average for all occupations through the mid-1980's. In addition to job openings resulting from this growth, several hundred actuaries will be needed each year to replace those who retire, die, or transfer to other occupations. Job opportunities will be best for new college graduates who have passed at least two actuarial examinations while still in school and have a strong mathematical and statistical background. However, because of the large number of persons expected to receive degrees in actuarial science, mathematics, and statistics, and the large number of students taking actuarial examinations, competition for beginning jobs should remain keen.

Employment in this occupation is influenced to a great extent by the volume of insurance sales, which will continue to grow over the next decade. Shifts in the age distribution of the population through the mid-1980's will result in many more people with established careers and family responsibilities. This is the group that traditionally has accounted for the bulk of private insurance sales.

Increased sales, however, are only one determinant of the demand for actuaries. In addition, changes in existing insurance practices are creating a need for more actuarial services. As more and more insurance companies branch out into more than one kind of insurance coverage, a greater number of actuaries will be needed to establish the rates for the variety of insurance offered. Growth in sales of relatively new forms of protection, such as dental, prepaid legal, and kidnap insurance will create additional demand for actuaries. As more States pass competitive rating laws, many companies that previously relied on rating bureaus for actuarial data can be expected to expand existing actuarial departments or create new ones.

Recent court decisions concerning product liability have focused much attention on this complex area. In the years ahead, actuaries will be spending a lot of time developing better ways to provide product liability, medical malpractice, and workers' compensation insurance protection.

Adoption of a "no-fault" automobile insurance plan requires companies writing automobile insurance to reevaluate their pricing structures in light of no-fault requirements. It is uncertain whether Federal no-fault legislation will be enacted soon; however, the growing number of States enacting no-fault plans or revising existing ones indicates continued strong demand for actuaries to make the required analyses.

ERISA has imposed strict responsibilities on actuaries for the operation and funding of pension plans. As the number of pension plans continues to grow, there will be an increasing need for pension specialists to develop adequately financed plans and to prepare the reports that certify their solvency.

Earnings and Working Conditions

In 1976, actuaries had average salaries more than twice as high as the average for all nonsupervisory workers in private industry, except farming. New college graduates entering the life insurance field without having passed any actuarial exams averaged $10,600 in 1976, according to a survey of U.S. companies by the Life Office Management Association (LOMA). Applicants who had successfully completed the first exam received $11,200 and those who had passed two exams averaged $11,800.

In the Federal Government, new graduates with the bachelor's degree could start at $9,300 a year in 1977. Applicants with either 1 year of graduate study or relevant work experience were hired at $11,500, and those with the master's degree or 2 years' experience started at $14,100 a year. Actuaries in the Federal Government averaged $25,100 a year in 1977.

Beginning actuaries can look forward to a marked increase in earnings as they gain professional experience and advance in an actuarial society's examination program. Life insurance companies usually give merit increases averaging from $500 to $850 to their actuaries as they pass each successive examination leading to membership in the Society of Actuaries. Associates who received that designation in 1976 averaged $16,500 a year; salaries for actuaries who were awarded a full fellowship during that year averaged $24,800. Fellows with additional years of experience earned substantially more—top actuarial executives averaged about $43,000 in 1976.

Although data are not available for salaries paid actuaries in casualty companies or consulting firms, it is believed that salaries for these specialists generally are comparable to those paid by life insurance companies.

Sources of Additional Information

For facts about actuarial opportunities and qualifications, contact:

American Society of Pension Actuaries, 1700 K St., NW., Washington, D.C. 20006.

Casualty Actuarial Society, 200 East 42nd St., New York, N.Y. 10017.

Society of Actuaries, 208 South LaSalle St., Chicago, Ill. 60604.

ADVERTISING WORKERS

(D.O.T. 050.088; 132.088; 141.081 and .168; 162.158; and 164.068 through .168)

Nature of the Work

Almost every business, from a small grocery store to a large bank, does some form of advertising to pursuade people to buy its products or use its services. Advertising requires the talents of people in many different kinds of jobs. Creative workers such as writers, artists, and designers develop and produce advertisements, while people with business and sales ability handle the arrangements for broadcasting the advertisements on radio and television, publishing them in newspapers or magazines, mailing them directly, or posting them on billboards. The following occupations are those most commonly associated with advertising.

Advertising managers direct the advertising program of the businesses for which they work. They determine the size of the advertising budget, the type of ad and the media to use, and what advertising agency, if any, to employ. Managers who decide to employ an agency work closely with the advertising specialists from the agency. These managers may supervise the preparation of pamphlets, brochures, or other materials developed to promote the firm's products or services. Advertising managers working for newspapers, radio stations, and other communications media have somewhat different duties. They are responsible for selling advertising time or space, and do work that is similar to the work of sales managers in other businesses.

Account executives are employed by advertising agencies to develop advertising programs for client firms and individuals. They first study the client's sales, public image, and advertising problems, and then create a program that suits the client's needs. In most agencies, artists and copywriters are responsible for developing the actual artwork and advertising copy, but in some small agencies, the account executives have this responsibility.

Research directors and their assistants study the market. They review possible uses for the product or service being sold, compare its advantages or disadvantages with those of competitors, and suggest ways of reaching potential buyers. To devel-[illegible] market information, these work-[illegible] may survey buying habits and mo-[illegible] of customers, or try out sample a[illegible] find the theme or medium that be[illegible]lls the product. (See the statement on marketing research workers for more information on this occupation.)

Advertising copywriters develop the headlines and text to be used in the ads. By studying information about the product and its potential customers, they are able to write copy aimed at the particular group of customers the advertiser seeks to attract. They may specialize in writing copy for a certain group of people, such as business managers, teenagers, or sports lovers, or for a class of products, such as cars or computer equipment. Copywriters usually work closely with account executives. In some agencies, they may be supervised by copy chiefs.

Artists and *layout workers* create the visual impact of an ad by selecting photographs, drawing illustrations or figures, and selecting the size or type of print to be used in a magazine or newspaper ad. When television commercials are planned, they usually sketch sample scenes for the client to consider. (See the statements on commerical artists and photographers for more information on this type of work.)

Media directors (or *space buyers* and *time buyers*) negotiate contracts for advertising space or air time. They determine the day and time when a television commercial will reach the largest group of prospective buyers at the lowest cost. To select the best medium for the advertiser, media directors must know the costs of using various media and the characteristics of the audience reached by specific publications or television stations.

Production managers and their assistants arrange to have the ad printed for publication, filmed for television, or recorded for radio. They must know which firms or freelance workers will be able to produce the best ad for the least cost.

Places of Employment

In 1976, about 180,000 people worked in jobs requiring considerable knowledge of advertising. Those employed in advertising agencies were heavily concentrated in New York City, Los Angeles, and Chicago.

Many others worked in the advertising departments of manufacturing firms, retail stores, banks, power companies, professional and trade associations, and many other organizations. Some people had advertising jobs with television or radio stations, newspapers, and magazines. Still other people in the advertising field worked for printers, art studios, letter shops, package design firms, and similar businesses.

Training, Other Qualifications, and Advancement

Most employers prefer college graduates. Some employers seek persons with degrees in advertising with heavy emphasis on marketing, business, and journalism; others prefer graduates with a liberal arts background (social science, literature, art, and other disciplines); some employers place little emphasis on the type of degree.

No particular educational background is equated with success in advertising. In fact, relevant work experience may be more important than educational background. Experience selling ads for school publications or radio stations, or on a summer job with a marketing research service, can be a distinct advantage to the jobseeker.

Some organizations recruit outstanding college graduates for training programs that cover all aspects of advertising work. In other firms, employees immediately enter a specialty and do not gain such all-round experience. Some beginners start as research or production assistants or as space or time buyers. A few begin as junior copywriters.

Many advertising jobs require imagination, creativity, and a flair for language. These traits are especially important to artists, layout workers, and account executives. All creative effort must be directed toward the sales function. People interested in becoming advertising managers, account executives, media buyers, and production managers must be able to get along well with people and be able to sell their ideas. Research directors and their assistants must have an understanding of human behavior. All advertising workers must be able to accept criticism of their work and be able to function as part of a team.

Opportunities for advancement in this field generally are excellent for creative, talented, and hard-working people. For example, copywriters and account executives may advance to more responsible work in their specialties, or to managerial jobs, if they demonstrate ability in dealing with clients. Some especially capable workers may become partners in an existing agency, or they may establish their own agency.

Employment Outlook

Employment of advertising workers is expected to increase faster than the average for all occupations through the mid-1980's. Most openings, however, will result from the need to replace workers who die, retire, or leave the occupation for other reasons.

The growing number of consumer and industrial goods and increasing competition in many product and service markets will cause advertising expenditures to rise. Such expenditures also may be spurred by the growing tendency toward self service in retail marketing. An additional factor is the growing need of small businesses for professional advertising services. Employment in advertising occupations is strongly affected by general business conditions because firms expand or contract their advertising budgets according to their financial success. Although opportunities should be favorable for highly qualified applicants, particularly in retail advertising, others seeking entry jobs will face keen competition because the glamorous nature of the field attracts many people.

Local television, radio, and newspapers are expected to increase their share of total advertising expenditures while direct mail, magazines, and national newspapers continue to lose ground. The few very large agencies that account for nearly all national advertising are expected to maintain fast growth because of their expanding international business.

Earnings and Working Conditions

Based on limited information, annual salaries for beginning advertising workers with bachelor's degrees ranged from $8,000 to $10,000 in 1976. Higher starting salaries generally were paid by the largest firms or advertising agencies to outstanding

Advertising can be a satisfying career for persons who enjoy variety, creative challenges, and competition.

applicants, particularly those with advertising experience.

Salaries of experienced advertising workers varied by size and type of firm as well as by type of job. According to a survey of advertising agencies taken in 1975, average annual salaries of workers in selected occupations were as follows: Chief executive officer, $45,300; account supervisor, $28,400; account executive, $18,500; executive art director, $24,400; art director, $17,100; senior layout artist, $12,900; junior layout artist, $9,300; copy chief, $22,300; senior copywriter, $16,600; junior copywriter, $10,500; media director, $16,800; space or time buyer, $9,400; research director, $24,000; research analyst, $13,500; production manager, $14,400. Several other surveys yielded these results: In 1976, the top advertising officers in large retail firms averaged over $32,000 a year; in 1975, the median salary of advertising directors in large banks ranged from $16,000 to $17,000 a year; in 1975, the average salary of advertising managers in a wide variety of companies ranged from $18,000 to $34,000 a year, depending upon the annual sales volume of the firm. Salaries of advertising managers generally are higher in consumer than industrial products firms, and many receive incentive compensation.

People in advertising work under great pressure, and do not have the job security enjoyed by workers in many other occupations. These workers are expected to produce quality ads in as short a time as possible. Sometimes they must work long or irregular hours to meet deadlines or make last-minute changes. Account executives, copywriters, and layout workers may become frustrated by a client's inability to define the type of ad he or she wants for a product.

Advertising can be a satisfying career for persons who enjoy variety, excitement, creative challenges, and competition. Unlike workers in many other occupations, advertising workers experience the satisfaction of having their work in print, on television, or on radio, even though they remain unknown to the public at large.

Sources of Additional Information

Information on advertising agencies and the careers they offer is available from:

American Association of Advertising Agencies, 200 Park Ave. New York, N.Y. 10017.

For additional information on careers and a list of colleges that provide training in advertising, contact:

American Advertising Federation, 1225 Connecticut Ave. NW., Washington, D.C. 20036.

AIR TRAFFIC CONTROLLERS

(D.O.T. 193.168)

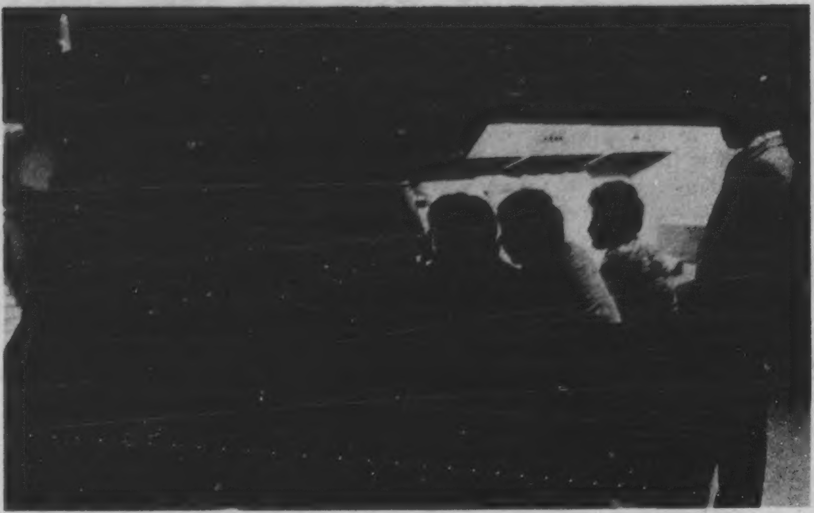
Nature of the Work

Air traffic controllers are the guardians of the airways. Controllers keep track of planes flying within their assigned area, giving pilots instructions that will keep the planes separated. Their immediate concern is safety, but within this framework, controllers must direct planes efficiently to minimize delays. Some regulate airport traffic; others regulate flights between airports.

From the control tower, airport traffic controllers can see the planes that are on the ground and in the air nearby. Planes that are farther away or at a higher altitude show up on the radar screen. As planes approach an airport, pilots radio ahead to inform the tower of their presence and request permission to land. If the way is clear, controllers direct the pilots to a runway; if the airport is busy, controllers fit the plane into a traffic pattern with other aircraft waiting to land. They also provide pilots with information about conditions at the airport, such as the weather, the speed and direction of the wind, and the visibility. Controllers constantly observe the planes under their direction, and if a controller notices that two planes are on a collision course, one of the pilots will be instructed to turn or change altitude.

A similar procedure is used for takeoffs. If necessary, a temporary break in traffic is arranged, the plane is instructed to depart, and a controller observes it on radar to guide the pilot around other planes.

After each plane departs, airport traffic controllers notify the enroute controllers who will be next to take



Controllers coordinate flight activities to prevent accidents and expedite takeoffs and landings.

charge. There are 25 enroute control centers located around the country. Enroute controllers work in teams of two or three. Because airplanes generally fly along specially designated routes, each team is assigned a certain amount of airspace along one of these routes. A team, for example, might be responsible for all planes that are between 30 to 100 miles north of the airport and flying at an altitude between 6,000 and 18,000 feet.

When a plane enters a team's airspace, one controller communicates with the pilots by radio and follows the plane's flight path on radar. The remaining team members prepare for other planes about to enter their area by communicating with neighboring control towers and adjacent centers, and organizing flight plans coming over teletype machines and computer displays. These plans were filed by pilots and provide controllers with information such as when a plane will enter the team's airspace and at what altitude.

Enroute controllers also warn pilots about nearby planes, bad weather conditions, and other possible hazards. If two planes are on a collision course they will be directed around each other. Or if a pilot wants to change altitude in search of better flying conditions, the controller will check to determine that no other planes will be along the proposed path during the altitude change.

As the flight progresses, the team responsible for the aircraft notifies the next team that will be in charge. Through this coordination, one team after another watches over the plane until it safely arrives at its destination.

Controllers usually have several planes under their control at one time, and often have to make quick decisions about completely different activities. For example, an airport controller might be directing a plane on its landing approach, and at the same time be providing pilots just entering the airport's airspace with information about conditions at the airport. While instructing these pilots, the controller also would be observing other planes in the vicinity, such as those in a holding pattern waiting for permission to land, to determine that they remain well separated.

Places of Employment

The sole employer of civilian air traffic controllers is the Federal Aviation Administration (FAA). About 21,000 persons worked as air traffic controllers in 1976, mostly at major airports and air route traffic control centers located near large cities.

Training, Other Qualifications, and Advancement

Air traffic controller trainees are selected through the competitive Federal Civil Service System. Applicants must be less than 31 years old and must pass a written test that measures their ability to learn and perform the controller's duties. In addition, applicants must have 3 years of general work experience or 4 years of college, or a combination of both. Applicants with sufficient experience as military controllers, pilots, or navigators may be hired without taking the written test. Applicants must be in excellent health and have vision correctable to 20/20.

Potential controllers should be articulate, since directions to pilots must be given quickly and clearly. A quick and retentive memory also is important because controllers constantly receive information about the planes under their direction which they must immediately grasp, interpret, and remember for a short period. A decisive personality is an asset, since controllers often have to make rapid decisions.

Successful applicants receive a combination of on-the-job and formal training to learn the fundamentals of the airway system, Federal aviation regulations, controller equipment, and aircraft performance characteristics. They receive approximately 16 weeks of intensive training, including practice on simulators, at the FAA Academy in Oklahoma City. It usually takes 2 to 3 years of progressively more responsible work experience to become a fully qualified controller. Each year, controllers must pass a physical examination; they must pass a job performance examination twice each year.

Controllers can transfer to jobs at different locations and advance to supervisory positions. Some advance to more responsible management jobs in air traffic control and a few to top administrative jobs in the FAA.

Employment Outlook

Employment of air traffic controllers is expected to increase faster than the average for all occupations through the mid-1980's. In addition to openings resulting from growth, many others will arise as experienced controllers retire, die, or leave the occupation for other reasons. Competition for jobs should be keen, however, because the number of qualified applicants is expected to be much greater than the number of openings.

As the number of aircraft increases, the skyways will become more congested and more controllers will be needed. Also, to prevent collisions, the FAA has created spaces near certain airports and above certain altitudes which require all pilots to receive directions from air traffic controllers. If, as expected, the number and size of these spaces are expanded, additional controllers will be needed despite the greater use of new, automated control equipment.

College graduates who have civilian or military experience as controllers, pilots, or navigators, will have the best employment opportunities.

Earnings and Working Conditions

In 1976 controller trainees earned $11,500 a year; the average earnings for all controllers was $22,300 a year, or over twice the average for all nonsupervisory workers in private industry, except farming. Depending on length of service, they receive 13 to 26 days of paid vacation and 13 days of paid sick leave each year, life insurance, health benefits, and, due to the stress involved in the work, a more liberal retirement program than other Federal employees.

Controllers work a basic 40-hour week; however, they may work additional hours for which they receive overtime pay or equal time off. Because control towers and centers must be operated 24 hours a day, 7 days a week, controllers are assigned to night and weekend shifts on a rotating basis.

Air traffic controllers sometimes work under great stress. They must keep track of several planes at the same time and make certain all pilots receive correct instructions.

Many controllers belong to the Professional Air Traffic Controllers Organization.

Sources of Additional Information

A pamphlet providing general information about controllers and instructions for submitting applications is available from any U.S. Civil Service Commission Job Information Center. Look under U.S. Government, Civil Service Commission, in your telephone book to obtain a local Job Information Center telephone number and call for a copy of Announcement 418. If there is no listing in your telephone book, dial the toll-free number 800-555-1212 and request the toll-free number of the U.S. Civil Service Commission Job Information Center for your location.

AIRPLANE PILOTS

(D.O.T. 196.168, .228, .268, and .283)

Nature of the Work

Pilots are skilled, highly trained professionals who fly planes to carry out a wide variety of tasks. Although most pilots transport passengers and cargo, many others perform tasks such as crop dusting, inspecting power lines, and taking photographs.

Except on small aircraft, two pilots usually are needed to fly the plane. Generally, the most experienced pilot (called captain by the airlines) is in command and supervises any other crew members on board. The copilot assists in communicating with air traffic controllers, monitoring the instruments, and flying the plane. Most large airliners have a third pilot in the cockpit who serves as flight engineer. The flight engineer assists the other pilots by monitoring and operating many of the instruments, making minor inflight repairs, and looking out for other aircraft.

Before departure, pilots plan their flights carefully. They confer with dispatchers and weather forecasters to find out about weather conditions on route and at their destination. Based on this information, they choose a route, altitude, and speed that will give a fast, safe, and smooth flight. It is the responsibility of the pilot in command to inform air traffic control of the flight plan so that the flight can be coordinated with other air traffic.

Before taking off, pilots thoroughly check their planes to determine that the engines, controls, instruments, and other components are working properly. They also make sure that baggage or cargo has been loaded correctly.

Takeoff and landing are the most difficult parts of the flight and require close coordination between the pilot and copilot. For example, as the plane accelerates for takeoff, the pilot concentrates on the runway while the copilot scans the instrument panel. The pilots already have calculated the speed they must attain to become airborne, taking into account the altitude of the airport, the weight of the plane, and the speed and direction of the wind. The moment the plane reaches this speed, the copilot informs the pilot who then pulls back on the controls to raise the nose of the plane.

Unless the weather is bad, the actual flight is relatively easy. Pilots steer the plane along their planned route, and radio their position, air speed, and other flight details to the air traffic control stations they pass along the way. They continuously scan the instrument panel to check their fuel and the condition of their engines. Pilots may request a change in altitude or route if circumstances dictate. For example, if the weather briefing led the pilots to expect a smoother ride than is being experienced, they may ask air traffic control if pilots flying at other altitudes have reported better conditions. If so, they may request a change. This procedure also may be used to find a stronger tailwind or a weaker headwind to save fuel and increase speed.

If visibility is poor, pilots must rely completely on their instruments. Using the readings on the altimeter, they know how high above ground they are and can fly safely over mountains and other obstacles. A special navigation radio gives pilots information which, with the help of special maps, tells them their exact position. Other, very sophisticated

Before takeoffs, pilots make sure all equipment is working properly.

equipment provides directions to a point just above the end of a runway and enables pilots to land completely "blind."

Once on the ground, pilots must complete records on their flight for their company and the Federal Aviation Administration (FAA).

Airline pilots have the services of large support staffs and consequently perform few nonflying duties. Pilots employed by businesses that use their own aircraft, however, usually are the businesses' only experts on flying and consequently have many other duties. For example, since pilots understand the requirements for a balanced plane, the business pilot loads the plane and handles all passenger luggage. While the plane is being refueled, the business pilot stays with it to assure that the job is done properly. Other nonflying responsibilities include keeping records, scheduling flights and major maintenance, and performing minor maintenance and repair work on their planes. Some pilots are instructors and spend much of their time giving flying lessons. They teach their students the principles of flight in ground school classes and demonstrate how to operate the aircraft in "dual-controlled" planes. A few specially trained pilots are "evaluators" or "check pilots." They fly with each airline pilot and copilot at least twice a year to make sure that they are proficient.

Places of Employment

About 83,000 civilian pilots worked full time in 1976. About one-half worked for the airlines. Much of the remainder worked as flight instructors at local airports or for large businesses that use their own airplanes to fly company cargo and executives. Some pilots flew small planes for air taxi companies, usually flying passengers to or from lightly traveled airports not serviced by the airlines. Others worked for a variety of businesses performing tasks such as crop dusting, inspecting pipelines, or conducting sightseeing trips. Federal, State, and local governments also employed pilots.

Most pilots work at the major airports located close to cities. In fact, over one-third of all pilots work near seven metropolitan areas—Los Angeles, San Francisco, New York, Dallas-Fort Worth, Chicago, Miami, and Atlanta.

Training, Other Qualifications, and Advancement

All pilots who are paid to transport passengers or cargo must have at least a commercial pilot's license from the FAA. To qualify for this license, applicants must be at least 18 years old and have at least 250 hours of flight experience. They also must pass a strict physical examination to make sure that they are in good health, have 20/20 vision with or without glasses, good hearing, and no physical handicaps that prevent quick reactions. Applicants must pass a written test that includes questions on the principles of safe flight, navigation techniques, and FAA regulations; and demonstrate their flying ability to FAA examiners.

In addition to a commercial license, pilots who want to fly in bad weather must be licensed by the FAA to fly by instruments. Pilots may qualify for this license by having 40 hours of experience flying by instruments, passing a written examination on procedures and FAA regulations covering instrument flying, and demonstrating their ability to fly by instruments.

Airline pilots must fulfill additional requirements. They must pass FAA written and flight examinations to earn a flight engineer's license. Captains must have an airline transport pilot's license. Applicants for this license must be at least 23 years old and have a minimum of 1,500 hours of flying experience during the previous 8 years, including night and instrument flying.

All licenses are valid as long as a pilot can pass the required physical examinations and the periodic tests of flying skills demanded by government regulations.

Flying can be learned in military or civilian flying schools. Either kind of training satisfies the flight experience requirements for licensing, but persons serving in the Armed Forces have the opportunity to gain the substantial experience on jet aircraft that is preferred by airlines and many businesses.

Pilots hired by airlines must be high school graduates; however, most airlines require 2 years of college and prefer to hire college graduates. Because pilots must be able to make quick decisions and accurate judgments under pressure, airline companies give all applicants psychological tests and reject those who do not pass.

New airline pilots usually start as flight engineers. Although airlines favor applicants who already have a flight engineer's license, they may train those who have only the commercial license. All new pilots receive several weeks of intensive training in simulators and classrooms before being assigned to a flight.

Companies other than airlines generally do not require as much flying experience. However, a commercial pilot's license is required and companies prefer applicants who have experience in the type of plane they will be flying. New employees generally start as copilots.

Advancement for all pilots generally is limited to other flying jobs. Many pilots start as flight instructors, building up their flying hours while they teach. As they become more experienced, these pilots occasionally may have the opportunity to fly charter planes and perhaps get jobs with small air transportation firms such as air taxi companies. Some advance to business flying jobs. Only a small number get flight engineer jobs with the airlines because the airlines prefer pilots who have been trained in the military.

In the airlines, advancement usually depends on seniority provisions established by union contracts. After 5 to 10 years, flight engineers advance according to seniority to co-pilot and, after 10 to 20 years, to captain. Seniority also determines which pilots get the more desirable routes. In non-airline jobs, copilots may advance to pilot and, in large companies, to chief pilot in charge of aircraft scheduling, maintenance, and flight procedures.

Employment Outlook

Employment of pilots is expected to increase faster than the average for all occupations through the mid-1980's. In addition to the jobs from employment growth, openings will result as experienced pilots die or retire. Competition for job openings should be keen, however, because the number of qualified pilots seeking jobs is expected to exceed the number of openings.

More than half the openings for pilots will occur outside the airlines. Businesses are expected to operate an increasing number of planes and employ more pilots to fly executives and cargo to locations that the scheduled airlines do not service. More flight instructors also will be needed to train new pilots.

The expected growth in airline passenger and cargo traffic will create a need for more airliners and more pilots to fly them. The short term outlook, however, is poor. The recent slowdown in air travel combined with the introduction of bigger planes has caused a temporary decrease in the need for airline pilots. Therefore, many of the new jobs that do develop will be taken by experienced airline pilots now on furlough.

Recent college graduates who have experience flying large, multi-engine aircraft and who have a commercial pilot's license and a flight engineer's license can expect first consideration for jobs with the major airlines. Businesses generally have fewer formal education and experience requirements than airlines. However, these companies prefer applicants with flying experience in the type of plane they will be flying on the job.

Earnings and Working Conditions

Earnings of airline pilots are among the highest in the Nation. In 1976, the average salary for airline pilots was $46,253 a year. Starting salaries for flight engineers averaged $9,000 a year, while some senior captains on the largest aircraft earned more than $80,000. Earnings depend on factors such as the type, size, and speed of the planes, and the number of hours and miles flown. Extra pay is given for night and international flights. As an additional benefit, pilots and their immediate families usually are entitled to a limited amount of reduced fare transportation on their own and other airlines.

Earnings of business pilots ranged from $10,000 for copilots on small planes to $45,000 for chief pilots of companies with large jets. Most business pilots flying single-engine planes made from $14,200 to $19,000 a year while salaries of those flying jets ranged from $16,500 to $29,500. Most flight instructors made between $7,000 and $16,000 a year while annual salaries for air taxi pilots ranged from $12,000 to $17,000.

By law, airline pilots cannot fly more than 85 hours a month. Most airline pilots actually fly less than 70 hours a month and, although they have additional nonflying duty hours, usually only work 16 days a month. However, the majority of flights involve layovers away from home. When pilots are away from home, the airlines provide hotel accommodations and an allowance for expenses. Airlines operate flights at all hours of the day and night, so work schedules often are irregular. Pilots with little seniority may be assigned night or early morning flights.

Pilots employed outside the airlines often have irregular schedules; they may fly 30 hours one month and 90 hours the next. Since these pilots frequently have many nonflying responsibilities, they have much less free time than airline pilots. With the exception of business pilots, most pilots employed outside the airlines do not remain away from home overnight. They may work odd hours, however. Instructors, for example, often give lessons at night or on weekends.

Although flying does not involve much physical effort, the mental stress of being responsible for a safe flight, no matter what the weather, can be very tiring. Particularly during takeoff and landing, pilots must be alert and ready to act if something goes wrong.

Most airline pilots are members of the Air Line Pilots Association, International. Those employed by one major airline are members of the Allied Pilots Association.

Sources of Additional Information

Information about job opportunities in a particular airline, and the qualifications required, may be obtained by writing to the personnel manager of the airline. Addresses of airline companies are available in the booklet *The People of the Airlines*. For a copy, write to:

Public Relations Department, Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

For information about the duties, as well as the physical and educational requirements for airline pilots, contact:

Air Line Pilots Association, International, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

For information about job opportunities in companies other than airlines, consult the classified section of aviation trade magazines and apply to companies that operate aircraft at local airports.

ANTHROPOLOGISTS

(D.O.T. 055.088)

Nature of the Work

Anthropologists study man—his origins, physical characteristics, and culture. These areas of study examine people's traditions, beliefs, customs, languages, material possessions, social relationships, and value systems. Although anthropologists generally specialize in one of four specific areas—cultural anthropology, archeology, linguistics, and physical anthropology—they are expected to have a general knowledge of all of them.

Most anthropologists specialize in cultural anthropology, sometimes called ethnology. *Ethnologists* may spend long periods living with tribal groups or in modern communities to learn about their ways of life. The cultural anthropologist lives with a group of people to observe and write about their social customs, beliefs, and material possessions. They usually learn the native language in the process. They also make comparative studies of the cultures and societies of various groups. In recent years, investigations have included fewer primitive societies and more complex urban societies, including ghetto inhabitants, drug addicts, and the aged.

Archeologists study cultures which no longer exist or have changed greatly. They study the remains of homes, tools, clothing, ornaments, and other evidences of human life and activity to reconstruct the inhabitants' history and customs. For example, in a desert in New Mexico, archeologists uncovered an ancient kiva— an Indian religious chamber. In a cave by the Dead Sea, some have found pieces of ancient scrolls 2,000 years old. Archeological teams also have excavated three large prehistoric communities along the Illinois River.

Linguistic anthropologists study the evolution of language and the place of language in a culture. They examine the sounds and structure of a society's language and relate them to the behavior and thought patterns of members of that society. Such studies may be used to trace the diffusion of a language or people over wide geographical areas.

Physical anthropologists studying human evolution investigate how the physical characteristics of different races or groups of people are influenced by heredity and environment. This work requires extensive training in human anatomy, biology, genetics, and the study of primates (the order of mammals that includes man, apes, and monkeys). A physical anthropologist may identify a fossil of a human ancestor or teach a chimpanzee to communicate with sign language.

A knowledge of body structure enables physical anthropologists to work as consultants on projects such as the design of cockpits for airplanes and spaceships, and the sizing of clothing.

Most new employment opportunities are expected to be in *applied anthropology*, a specialty which uses the findings of anthropology in a practical manner. Applied cultural anthropologists may, for example, provide technical guidelines to ease the transition of nonindustrial societies to a more complex level of socioeconomic organization, or a medical anthropologist studying cultural attitudes towards health and medical treatment may help formulate and administer a health program for an ethnic minority. Many medical schools hire medical anthropologists as instructors.

Applied linguistic anthropologists may create a written alphabet to help advance literacy in societies with unwritten languages. Another related specialty area is *urban anthropology*, the study of urban life, urbanization, rural-urban migration, and the influence of city life.

Most anthropologists teach in colleges and universities, and they often combine teaching with research. Some specialize in museum work, which generally combines administrative duties with fieldwork and research on anthropological collections. Anthropologists also write cultural, social, and archeological impact statements for proposed Government projects. Some work in business and industry including construction firms or engage in nontechnical writing.

Places of Employment

About 3,500 persons worked as anthropologists in 1976. About four-fifths of all anthropologists work in colleges and universities. The Federal Government employs a small but growing number, chiefly in museums, national parks, the Bureau of Indian Affairs, the Army Corps of Engineers, and technical aid programs. State and local government agencies employ anthropologists, usually for museum work or health research.

Some work as consultants in private, community, or overseas development organizations.

Training, Other Qualifications, and Advancement

Students who want to become anthropologists should obtain the Ph. D. degree. College graduates with bachelor's degrees often get temporary positions and assistantships in graduate departments where they are working for advanced degrees. A master's degree, plus field experience, is sufficient for many beginning professional positions, but promotion to top positions generally is reserved for individuals who have a Ph. D. degree. Many colleges and universities require a Ph. D. degree for permanent teaching appointments. Persons with a master's or bachelor's degree in anthropology may be hired as government social science analysts or placed in managerial positions by private employers.

A student interested in studying anthropology should have a strong background in the social and physical sciences. Mathematics is helpful, since statistical and computer methods are becoming more widely used for research in this field. Undergraduates may begin their field training in archeology by arranging, through their university departments, to accompany expeditions as laborers or to attend field schools established for training. They may later become supervisors in charge of the digging or collection of material and finally may direct a portion of the work of the expedition. Ethnologists and linguists usually do their fieldwork independently. Most anthropologists base their doctoral dissertations on data collected through field research; they are, therefore, experienced fieldworkers by the time they earn the Ph. D. degree.

Nearly 300 colleges and universities have bachelor's degree programs in anthropology; some 130 offer master's degree programs and about 80, doctoral programs. The choice of a graduate school is very important. Students interested in museum work should select a school which is associated with a museum that has anthropological collections. Similarly, those interested in archeology should choose either a university that offers opportunities for summer experience in archeological fieldwork, or attend an archeological field school elsewhere during summer vacations.

Anthropologists should have special interest in natural history and social studies and enjoy reading, research, and writing. Traveling to remote areas, working in an uncomfortable climate, and living in primitive housing are sometimes necessary.

Anthropologists work with ideas and have the opportunity for self-expression. They should be able to work independently and with detail.

(For information on advancement, see the *Handbook* statement on College and University Teachers.)

Employment Outlook

Employment of anthropologists is expected to increase about as fast as the average for all occupations. Most new jobs are expected to be in private industry, the Federal Government, mental and public health agencies, and urban planning departments of city governments. College and university teaching, which will remain the largest area of employment for anthropologists, is likely to have little growth due to the projected slowdown in college enrollments.

The number of qualified anthropologists seeking to enter the field will likely exceed available positions. As a result, doctorate holders may face keen competition through the mid-1980's, particularly for jobs in colleges and universities. Graduates with only bachelor's and master's degrees are expected to face very keen competition, although they may be preferred for some nonacademic positions. Some teaching positions may be available in junior colleges or high schools for those who meet state certification requirements.

Earnings and Working Conditions

Starting salaries for anthropologists with a Ph. D. degree were generally about $16,000 a year in 1976. Most experienced anthropologists earned between $17,000 and $27,000 a year, according to limited data available. In general, salaries of experienced anthropologists are a little less than the average for all social science professional workers.

In the Federal Government, anthropologists having a bachelor's degree could begin as trainees at $9,303 or $11,523 a year in 1977, depending upon the applicant's academic record. The starting salary for those having a master's degree was $14,097 a year, for those having a Ph. D., $17,056. Anthropologists in the Federal Government averaged around $23,800 in 1977.

Many anthropologists in colleges and universities supplement their regular salaries with earnings from other sources such as summer teaching and research grants.

Anthropologists sometimes are required to do fieldwork under adverse weather conditions. They also must adapt themselves to cultural environments which are materially and socially different.

Sources of Additional Information

For information about employment opportunities and schools that offer graduate training in anthropology, contact:

The American Anthropological Association, 1703 New Hampshire Ave. NW., Washington, D.C. 20009.

The Archeological Institute of America, 260 W. Broadway, New York, N.Y. 10013.

ARCHITECTS

(D.O.T. 001.081)

Nature of the Work

Attractive buildings improve the physical environment of a community. But buildings also must be safe and must allow people both inside and around them to perform their duties properly. Architects design buildings that successfully combine these elements of attractiveness, safety, and usefulness.

Most architects provide professional services to clients planning a building project. They are involved in all phases of development of a building or project, from the initial discussion of general ideas to the final piece of construction. Their duties require a variety of skills—design, engineering, managerial, and supervisory.

The architect and client first discuss the purposes, requirements, and cost of a project, as well as any preference in design that the client may have. The architect then prepares schematic drawings to show the scale and structural relationships of the building.

If the schematic drawings are accepted, the architect develops a final design showing the floor plans and the structural details of the project. For example, in designing a school, the architect determines the width of corridors and stairways so that students may move easily from one class to another; the type and arrangement of storage space, and the location and size of classrooms, laboratories, lunchroom or cafeteria, gymnasium, and administrative offices.

Next the architect prepares working drawings showing the exact dimensions of every part of the structure and the location of plumbing, heating units, electrical outlets, and air conditioning.

Architects also specify the building materials, and, in some cases, the interior furnishings. In all cases, the architect must insure that the structure's design and specifications conform to local and State building codes, zoning laws, fire regulations, and other ordinances.

Throughout this time, the architect may make changes to satisfy the client. A client may, for example, decide that an original house plan is too expensive and ask the architect to make modifications. Or clients may decide that their own ideas are more appealing than those of the architect. As a result, architects could become frustrated, redesigning their plans to meet the clients' expectations.

After all drawings are completed, the architect assists the client in selecting a contractor and negotiating the contract. As construction proceeds, the architect makes periodic visits to the building site to insure that the contractor is following the design, using the specified materials, and meeting the specified quality standards. The job is not completed until construction is finished, all required tests are made, bills are paid, and guarantees are received from the contractor.

Architects design a wide variety of structures such as houses, churches, hospitals, office buildings, and airports. They also design multibuilding complexes for urban renewal projects, college campuses, industrial parks, and new towns. Besides designing structures, architects also may help in selecting building sites, preparing cost and land-use studies, and long-range planning for site development.

When working on large projects or for large architectural firms, architects often specialize in one phase of the work such as designing, or administering construction contracts. This often requires working with engineers, urban planners, landscape architects, and other design personnel.

Places of Employment

About 50,000 registered (licensed) architects were employed in 1976. In addition, many unlicensed architectural school graduates also work as architects, but they must work under the supervision of licensed architects.

Most architects work in architectural firms, for builders, for real estate firms, or for other businesses that have large construction programs. Some work for government agencies, often in city and community planning or urban redevelopment. About 1,300 architects work for the Federal Government, mainly for the Departments of Defense, Housing and Urban Development, and the General Services Administration.

Although found in many areas, a large proportion of architects are employed in seven cities: Boston, Chicago, Los Angeles, New York, Philadelphia, San Francisco, and Washington.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require architects to be licensed. To qualify for the 2-day licensing exam, a person must have either a bachelor of architecture degree followed by 3 years of experience in an architect's office or a master of architecture degree followed by 2 years of experience. As a substitute for formal training, most States accept additional experience (usually 12 years) and successful completion of a qualifying test for admission to the licensing examination. Many architectural school graduates work in the field even though they are not licensed. However, a registered architect is required to take legal responsibility for all work.

In 1976, the National Architectural Accrediting Board had accredited 80 of the 101 schools offering professional degrees in architecture. Most of these schools offer a 5-year curriculum leading to a Bachelor of Architecture degree or a 6-year curriculum leading to a Master of Architecture degree. Students also may transfer to professional degree programs after completing a 2-year junior or community college program in architecture. Many architectural schools also offer graduate education for those who already have their first professional degree. Although such training is not essential for practicing architects, it often is desirable for those in research and teaching. A typical college architectural program includes courses in architectural theory, design, graphics, engineering, and urban planning, as well as in English, mathematics, chemistry, sociology, economics, and a foreign language.

Persons planning careers in architecture should be able to work independently, have a capacity for solving technical problems, and be artistically inclined. They also must be prepared to work in the competitive environment of business where leadership and ability to work with others are important. Working for architects or building contractors during summer vacations is useful for gaining practical knowledge.

New graduates usually begin as junior drafters in architectural firms.

New graduates usually begin as junior drafters in architectural firms, where they prepare architectural drawings and make models of structures under the direction of a registered architect. After several years of experience, they may advance to chief or senior drafter responsible for all major details of a set of working drawings and for supervising other drafters. Others may work as designers, construction contract administrators, or specification writers who prepare directions explaining the architect's plan to the builder. Employees who become associates in their firms receive, in addition to a salary, a share of the profits. Usually, however, the architect's goal is to own his or her own business.

Employment Outlook

Architects are expected to face competition for jobs through the mid-1980's. Although employment of architects is expected to rise about as fast as the average for all workers during this period, the number of degrees granted in architecture also has been increasing rapidly. If this trend continues, the number of people seeking employment in the field could exceed the number of openings from growth, deaths, and retirements. The best employment prospects are expected to occur in the South and in those States which do not have architectural schools.

The outlook for these workers may change, however, during short-run periods. Because the demand for architects is highly dependent upon the level of new construction, any significant upsurge or downturn in building could temporarily alter demand.

Most job openings are expected to be in architectural firms but some openings are also expected to occur in colleges and universities, construction firms, and the Government.

The major factor contributing to the increase in employment of architects is the expected rapid growth of nonresidential construction. In addition, the projected increase in enrollments in architectural programs should result in additional requirements for architects to teach in colleges and universities.

Growing public concern about the quality of the physical environment is expected to increase the demand for urban redevelopment and city and community environmental planning projects. This should create further opportunities for employment. (See statement on urban planners elsewhere in the *Handbook*.)

Earnings and Working Conditions

The average salary for architects in 1976 was well over $20,000, according to the limited information available. Architects with well-established private practices generally earn much more than even highly paid salaried employees of architectural firms. Although the range in their incomes is very wide, some architects with many years of experience and good reputations earned well over $35,000 a year. Architects starting their own practices may go through a period when their expenses are greater than their income. Annual income may fluctuate due to changing business conditions.

In 1977, the average salary for architects working in the Federal Government was about $23,000.

Most architects spend long hours at the drawing board in well equipped offices. An architect sometimes has to work overtime to meet a deadline. The routine often is varied by interviewing clients or contractors and discussing the designs, construction procedures, or building materials of a project with other architects or engineers. Contract administrators frequently work outdoors during inspections at construction sites.

Sources of Additional Information

General information about careers in architecture, including a catalog of publications, can be obtained from:

The American Institute of Architects, 1735 New York Ave. NW., Washington, D.C. 20006.

Information about schools of architecture and a list of junior colleges offering courses in architecture are available from:

The Association of Collegiate Schools of Architecture, Inc., 1735 New York Ave. NW., Washington, D. C. 20006.

Information about the licensing examinations can be obtained from:

The National Council of Architectural Registration Boards, 1735 New York Ave. NW., Suite 700, Washington, D.C. 20006.

ASTRONOMERS

(D.O.T.021.088)

Nature of the Work

Astronomers seek answers to questions about the fundamental nature of the universe, such as its origin and history and the evolution of our solar system. Astronomers—sometimes called *astrophysicists*—use the principles of physics and mathematics to study and determine the behavior of matter and energy in distant galaxies. One application of the information they gain is to prove or disprove theories of the nature of matter and energy such as Einstein's theory of relativity.

To make observations of the universe, astronomers use large telescopes, radiotelescopes, and other instruments that can detect electromagnetic radiation from distant sources. Astronomers of today spend little time visually observing stars through telescopes because photographic and electronic light-detecting equipment is more effective with dim or distant stars, and galaxies. By using spectroscopes to analyze light from stars astronomers can determine their chemical composition. Astronomers also use radiotelescopes and other electronic means to observe radio waves, X-rays, and cosmic rays. Electronic computers are used to analyze data and to solve complex mathematical equations that astronomers develop to represent various theories. Computers also are useful for processing astronomical data to calculate orbits of asteroids or comets, guide spacecraft, and work out tables for navigational handbooks.

Astronomers usually specialize in one of the many branches of the science such as instruments and techniques, the sun, the solar system, and the evolution and interiors of stars.

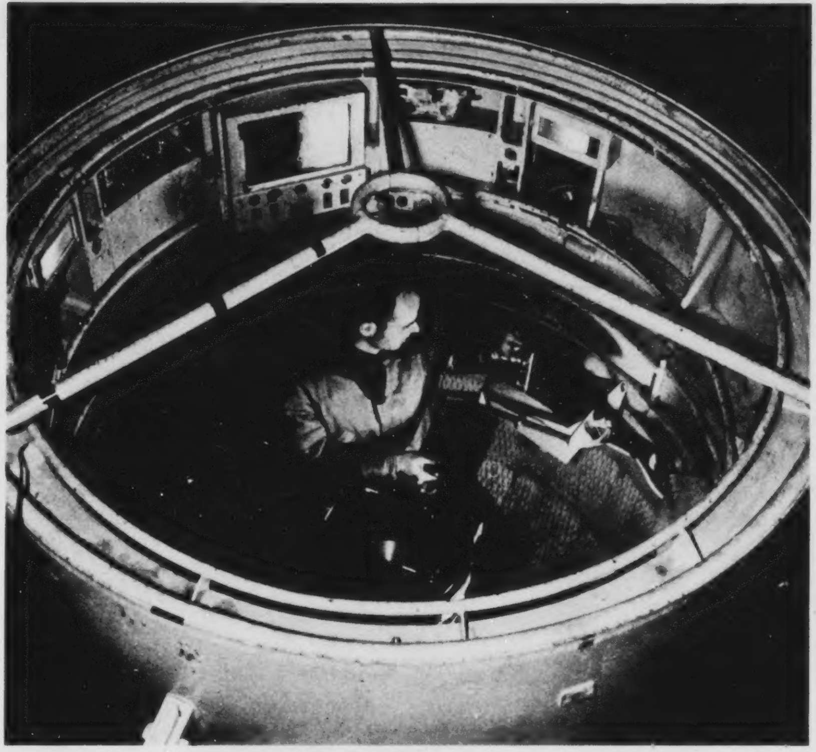
Astronomers who work on observational programs begin their studies by deciding what stars or other objects to observe and the methods and instruments to use. They may need to design optical measuring devices to attach to the telescope to make the required measurements. After completing their observations, they analyze the results, present them in precise numerical form, and explain them on the basis of some theory. Astromomers usually spend relatively little time in actual observation and relatively more time in analyzing the large quantities of data that observatory facilities collect.

Some astronomers concentrate on theoretical problems and seldom visit observatories. They formulate theories or mathematical models to explain observations made earlier by other astronomers. These astronomers develop mathematical equations using the laws of physics to compute, for example, theoretical models of how stars change as their nuclear energy sources become exhausted.

Almost all astronomers do research or teach; those in colleges and universities often do both. In schools that do not have separate departments of astronomy or only small enrollments in the subject, they often teach courses in mathematics or physics as well as astronomy. Some astronomers administer research programs, develop and design astronomical instruments, and do consulting work.

Places of Employment

Astronomy is the smallest physical science; only 2,000 persons worked as astronomers in 1976. Most astronomers work in colleges and universities. Some work in observatories operated by universities, nonprofit organizations, and the Federal Government.



Almost all astronomers do research or teach.

The Federal Government employed almost 600 astronomers and space scientists in 1976. Most worked for the National Aeronautics and Space Administration. Others worked for the Department of Defense, mainly at the U.S. Naval Observatory and the U.S. Naval Research Laboratory. A few astronomers worked for firms in the aerospace field, or in museums and planetariums.

Training, Other Qualifications, and Advancement

The usual requirement for a job in astronomy is a Ph. D. degree. Persons with less education may qualify for some jobs; however, high-level positions in teaching and research and advancement in most areas are open only to those with the doctorate.

Many students who undertake graduate study in astronomy have a bachelor's degree in astronomy. In 1976, about 50 colleges and universities had programs leading to the bachelor's degree in astronomy. However, students with a bachelor's degree in physics, or in mathematics with a physics minor, usually can qualify for graduate programs in astronomy.

About 55 universities offer the Ph. D. degree in astronomy. These programs include advanced courses in astronomy, physics, and mathematics. Some schools require that graduate students spend several months working at an observatory. In most institutions, the work program leading to the doctorate is flexible and allows students to take courses in their own particular area of interest.

Persons planning careers in astronomy should have imagination and an inquisitive mind. Perseverance and the ability to concentrate on detail and to work independently also are important.

New graduates with a bachelor's or master's degree in astronomy usually begin as assistants in observatories, planetariums, large departments of astronomy in colleges and universities, Government agencies, or industry. Some work as research assistants while studying toward advanced degrees. New graduates with the doctorate can qualify for teaching and research jobs in colleges and universities and for research jobs in Government and industry.

Employment Outlook

Persons seeking positions as astronomers will face keen competition for the few available openings expected through the mid-1980's. Employment of astronomers is expected to grow slowly, if at all, because the funds available for basic research in astronomy, which come mainly from the Federal Government, are not expected to increase enough to create many new positions. Most openings will occur as replacements for those who die or retire. Since astronomy is such a small profession, there will be few openings needed for replacements. There will be keen competition for these openings because the number of degrees granted in astronomy probably will continue to exceed available openings.

Earnings and Working Conditions

Astronomers have relatively high salaries, with average earnings more than twice the average earnings for nonsupervisory workers in private industry, except farming.

In the Federal Government in 1977, astronomers holding the Ph. D. degree could begin at $17,056 or $20,442 depending on their college record. Those having the bachelor's degree could start at $9,303 or $11,523; with the master's degree at $11,523 or $14,097. The average annual salary for astronomers and space scientists in the Federal Government was about $25,100 in 1977. Astronomers teaching in colleges and universities received salaries equivalent to those of other faculty members. (See statement on college and university teachers elsewhere in the *Handbook*.)

Most astronomers spend most of their time working in offices or classrooms, although astronomers who make observations may need to travel to the observing facility and frequently work at night.

Sources of Additional Information

For information on careers in astronomy and on schools offering training in the field, contact:

American Astronomical Society, 211 FitzRandolph Rd., Princeton, N.J. 08540.

BANK OFFICERS AND MANAGERS

(D.O.T. 186.118, .138, .168, and .288; 161.118, 189.118 and .168)

Nature of the Work

Practically every bank has a president who directs operations; one or more vice presidents who act as general managers or who are in charge of bank departments such as trust or credit; and a comptroller or cashier who, unlike cashiers in stores and other businesses, is an executive officer generally responsible for all bank property. Large banks also may have treasurers and other senior officers, as well as junior officers, to supervise the various sections within different departments. Banks employed over 300,000 officers and managers in 1976.

Bank officers make decisions within a framework of policy set by the board of directors and existing laws and regulations. They must have a broad knowledge of business activities to relate to the operations of their department. For example, loan officers evaluate the credit and collateral of individuals and businesses applying for a loan. Similarly, trust officers must understand each account before they invest funds to support families, send young people to college, or pay retirement pensions. Besides supervising financial services, officers advise individuals and businesses and participate in community projects.

Because banks offer many services, a wide choice of careers is available to workers who specialize.

Loan officers may handle installment, commercial, real estate, or agricultural loans. To evaluate loan applications properly, officers need to

A loan officer evaluates an individual's credit rating before approving a loan.

be familiar with economics, production, distribution, merchandising, and commercial law. Also, they need to know business operations and should be able to analyze an industry's financial statements.

Bank officers in trust management require knowledge of financial planning and investment for investment research and for estate and trust administration.

Operations officers plan, coordinate, and control the work flow, update systems, and strive for administrative efficiency. Careers in bank operations include electronic data processing manager and other positions involving internal and customer services.

A correspondent bank officer is responsible for relations with other banks; a branch manager, for all functions of a branch office; and an international officer, for advising customers with financial dealings abroad. A working knowledge of a foreign country's financial system, trade relations, and economic conditions is beneficial to those interested in international banking.

Other career fields for bank officers are auditing, economics, personnel administration, public relations, and operations research.

Training, Other Qualifications, and Advancement

Bank officer and management positions generally are filled by management trainees, and occasionally by promoting outstanding bank clerks or tellers. College graduation usually is required for management trainees. A business administration major in finance or a liberal arts curriculum including accounting, economics, commercial law, political science, and statistics serves as excellent preparation for officer trainee positions. In fact, a Master of Business Administration (MBA) in addition to a social science bachelor's degree comes closest to the "ideal" college education. However, banks do hire people with diverse backgounds such as chemical engineering, nuclear physics, and forestry to meet the needs of complex, high-technology industries with which they deal. Valuable experience may be gained through summer employment programs.

A management or officer trainee may spend a year or two learning the various banking areas before choosing a permanent position. This practice is common but not universal. A bank may hire an applicant with specific skills for a position that is clearly defined at the outset.

Persons interested in becoming bank officers should like to work independently and to analyze detailed information. They also need tact and good judgment to counsel customers and supervise employees.

Advancement to an officer or management position may come slowly in small banks where the number of positions is limited. In large banks that have special training programs, promotions may occur more quickly. For a senior officer position, however, an employee usually needs many years of experience.

Although experience, ability, and leadership are emphasized for promotion, advancement may be accelerated by special study. The American Bankers Association (ABA) offers courses, publications, and other training aids to officers on every phase of banking. The American Institute of Banking, an arm of the ABA, has long filled the same educational need among bank support personnel. (See the statement on the banking industry elsewhere in the *Handbook* for more information on these and other training programs sponsored by universities and local bankers' associations.)

Employment Outlook

Through the mid-1980's, employment of bank officers is expected to increase faster than the average for all occupations. Rising costs due to expanded banking services and the increasing dependence on computers will require more officers to provide sound management and effective quality control. Opportunities also will arise as experienced officers leave their jobs. College graduates who meet the standards for management trainees should find good opportunities for entry positions.

Earnings

Officer trainees at the bachelor's level generally earned between $800 and $900 a month in 1976. Those with an M.A. or M.S. started at between $1,000 and $1,200 a month. A Master of Business Administration, however, appears to be worth more in salary terms: graduates with an MBA were offered starting salaries of $1,300 to $1,400 a month in 1976.

Salaries of senior bank officers may be several times as much as starting salaries. The actual salary level depends upon the particular position and the size and location of the bank. For officers, as well as for other bank employees, earnings are likely to be lower in small towns than in big cities.

See the statement on the banking industry elsewhere in the *Handbook* for additional information on banking occupations.

BIOCHEMISTS

(D.O.T. 041.081)

Nature of the Work

Biochemists study the chemical composition and behavior of living things. Since life is based on complex chemical combinations and reactions, the work of biochemists is vital for an understanding of reproduction, growth, and heredity. Biochemists also may study the effects of food, hormones, or drugs on various organisms.

The methods and techniques of biochemistry are applied in areas such as medicine, nutrition, and agriculture. For instance, biochemists may investigate causes and cures for diseases, identify the nutrients necessary to maintain good health, or develop chemical compounds for pest control.

More than 3 out of 4 biochemists work in basic and applied research activities. The distinction between basic and applied research is often one of degree and biochemists may do both types. Most, however, are in basic research. The few doing strictly applied research use the results of basic research to solve practical problems. For example, knowledge of how an organism forms a hormone is used to synthesize and produce hormones on a mass scale.

Laboratory research involves weighing, filtering, distilling, drying, and culturing (growing microorganisms). Some experiments also require the designing and constructing of laboratory apparatus or the use of radioactive tracers. Biochemists use a variety of instruments, including electron microscopes and centrifuges, and they may devise new instruments and techniques as needed. They usually report the results of their research in scientific journals or before scientific groups.

Some biochemists combine research with teaching in colleges and universities. A few work in industrial production and testing activities.

Places of Employment

About 12,700 biochemists were employed in the United States in 1976. About one-half are employed in colleges and universities; over one-fourth work in private industry, primarily in companies manufacturing drugs, insecticides, and cosmetics; some work for nonprofit research institutes and foundations; and others for Federal, State, and local government agencies. Most government biochemists do health and agricultural research for Federal agencies. A few self-employed biochemists are consultants to industry and government.

Many biochemists work in basic and applied research activities.

Training, Other Qualifications, and Advancement

The minimum educational requirement for many beginning jobs as a biochemist, especially in research or teaching, is an advanced degree. A Ph. D. degree is a virtual necessity for persons who hope to contribute significantly to biochemical research and advance to many management and administrative jobs. A bachelor's degree with a major in biochemistry or chemistry, or with a major in biology and a minor in chemistry, may qualify some persons for entry jobs as research assistants or technicians.

More than 100 schools award the bachelor's degree in biochemistry, and nearly all colleges and universities offer a major in biology or chemistry. Persons planning careers as biochemists should take undergraduate courses in chemistry, biology, biochemistry, mathematics, and physics.

About 150 colleges and universities offer graduate degrees in biochemistry. Graduate students generally are required to have a bachelor's degree in biochemistry, biology, or chemistry. Many graduate programs emphasize one specialty in biochemistry because of the facilities or the research being done at that particular school. Graduate training requires actual research in addition to advanced science courses so students should select their schools carefully. For the doctoral degree, the student does intensive research and a thesis in one field of biochemistry.

Persons planning careers as biochemists should be able to work independently or as part of a team. Precision, keen powers of observation, and mechanical aptitude also are important. Biochemists should have analytical abilities and curious minds, as well as patience and perseverance to complete hundreds of experiments necessary to solve a single problem. They should also express themselves clearly when writing and speaking to communicate the findings of their research effectively.

Graduates with advanced degrees may begin their careers as teachers or researchers in colleges or universities. In private industry, most begin in research jobs and with experience may advance to positions in which they plan and supervise research.

New graduates with a bachelor's degree usually start work as research assistants or technicians. These jobs in private industry often involve testing and analysis. In the drug industry, for example, research assistants analyze the ingredients of a product to verify and maintain its purity or quality.

Employment Outlook

Job opportunities for biochemists with advanced degrees should be favorable through the mid-1980's. The employment of biochemists is expected to grow about as fast as the average for all occupations during this period. Some additional job openings will result each year as biochemists retire, die, or transfer to other occupations. The outlook for biochemists is based on the assumption that research and development expenditures in biochemistry and related sciences, primarily by the Federal Government, will increase through the mid-1980's, although at a slower rate than during the 1960's. If actual expenditures differ significantly from those assumed, the outlook for biochemists would be altered.

The anticipated growth in this field should result from the effort to find cures for cancer, heart disease, and other diseases, and from public concern with environmental protection. Biochemists will also be needed in the drug and other industries and in hospitals and health centers. Colleges and universities may need additional teachers as biochemistry enrollments continue to increase.

Earnings and Working Conditions

Average earnings of biochemists were about twice the average for all nonsupervisory workers in private industry, except farming. According to a 1976 survey by the American Chemical Society, salaries for experienced biochemists averaged $18,000 for those with a bachelor's degree; $19,000 for those with a master's degree; and $26,000 for those with a Ph. D.

Starting salaries of biochemists employed in colleges and universities are comparable to those for other faculty members. (See statement on college and university teachers elsewhere in the *Handbook*.)

Biochemists in research and development do most of their work in a laboratory, but they also may write, lecture, and do library research.

Sources of Additional Information

For general information on careers in biochemistry, contact:

American Society of Biological Chemists,
9650 Rockville Pike, Bethesda, Md.
20014.

BLUE-COLLAR WORKER SUPERVISORS

Nature of the Work

In any organization, someone has to be boss. For the millions of workers who assemble television sets, service automobiles, lay bricks, unload ships, or perform any of thousands of other activities, a blue-collar worker supervisor is the boss. These supervisors direct the activities of other employees and frequently are responsible for seeing that millions of dollars worth of equipment and materials are used properly and efficiently. While blue-collar worker supervisors are most commonly known as foremen or forewomen, they also have many other titles. In the textile industry they are referred to as second hands; on ships they are known as boatswains; and in the construction industry they are often called overseers, straw bosses, or gang leaders.

Although titles may differ, the job of all blue-collar worker supervisors is similar. They tell other employees what jobs are to be done and make sure the jobs are done correctly. For example, loading supervisors at truck terminals assign workers to load trucks, and then check that the material is loaded correctly and that each truck is fully used. They may mark freight bills and keep charts to record the loads and weight of each truck. In some cases, supervisors also do the same work as other employees. This is especially true in the construction industry where, for example, bricklayer supervisors also lay brick.

Because they are responsible for the output of other workers, supervisors make work schedules and keep production and employee records. They use considerable judgment in planning and must allow for unforeseen problems such as absent workers and machine breakdowns. Teaching employees safe work habits and enforcing safety rules and regulations are other supervisory responsibilities. They also may demonstrate timesaving or laborsaving techniques to workers and train new employees.

In addition to their other duties, blue-collar worker supervisors tell their subordinates about company plans and policies; reward good workers by making recommendations for wage increases, awards, or promotions; and deal with poor workers by issuing warnings or recommending that they be fired or laid off without pay for a day or more. In companies where employees belong to labor unions, supervisors may meet with union representatives to discuss work problems and grievances. They must know the provisions of labor-management contracts and run their operations according to these agreements.

Places of Employment

About 1,445,000 blue-collar worker supervisors were employed in 1976. Although they work for almost all businesses and government agencies, over half work in manufacturing, supervising the production of cars, washing machines, or any of thousands of other products. Most of the rest work in the construction industry, in wholesale and retail trade, and in public utilities. Because employment is distributed in much the

Coordinating assignments is a responsibility of the blue-collar worker supervisor.

same way as population, jobs are located in all cities and towns.

Training, Other Qualifications, and Advancement

When choosing supervisors, employers generally look for experience, skill, and leadership qualities. Employers place special emphasis on the ability to motivate employees, maintain high morale, command respect, and get along with people. Completion of high school often is the minimum educational requirement, and 1 or 2 years of college or technical school can be very helpful to workers who want to become supervisors.

Most supervisors rise through the ranks—that is, they are promoted from jobs where they operated a machine, or worked on an assembly line, or at a construction craft. This work experience gives them the advantage of knowing how jobs should be done and what problems may arise. It also provides them with insight into management policies and employee attitudes towards these policies. Supervisors are sometimes former union representatives who are familiar with grievance procedures and union contracts. To supplement this work experience, larger companies usually have training programs to help supervisors make management decisions. Smaller companies often use independent training organizations or written training materials.

Although few blue-collar worker supervisors are college graduates, a growing number of employers are hiring trainees with a college or technical school background. This practice is most prevalent in industries with highly technical production processes, such as the chemical, oil, and electronics industries. Employers generally prefer backgrounds in business administration, industrial relations, mathematics, engineering, or science. The trainees undergo on-the-job training until they are able to accept supervisory responsibilities.

Supervisors with outstanding ability, particularly those with college education, may move up to higher management positions. In manufacturing, for example, they may advance to jobs such as department head and plant manager. Some supervisors, particularly in the construction industry, use the experience and skills they gain to go into business for themselves.

Employment Outlook

Employment of blue-collar worker supervisors is expected to increase at about the same rate as the average for all occupations through the mid-1980's. In addition, many job openings will arise as experienced supervisors retire, die, or transfer to other occupations.

Population growth and rising incomes will stimulate demand for goods such as houses, air conditioners, TV sets, and cars. As a result, more blue-collar workers will be needed to produce and sell these items, and more supervisors will be needed to direct their activities. Although most of these supervisors will continue to work in manufacturing, a large part of the increase in jobs will be due to the expansion of nonmanufacturing industries, especially in the trade and service sectors.

There is usually keen competition for supervisory jobs. Competent workers who possess leadership ability and have a few years of collge are the most likely to be selected.

Earnings and Working Conditions

In 1976, average annual earnings of blue-collar worker supervisors who worked full time were $15,149, compared with $12,946 for workers in all occupations. Supervisors usually are salaried. Their salaries generally are determined by the wage rates of the highest paid workers they supervise. For example, some companies keep wages of supervisors about 10 to 30 percent higher than those of their subordinates. Some supervisors may receive overtime pay.

Since supervisors are responsible for the work of other employees, they generally work more than 40 hours a week and are expected to be on the job before other workers arrive and after they leave. They sometimes do paperwork at home, such as making work schedules or checking employee time cards, and may find themselves worrying about job-related problems after work.

Working conditions vary from industry to industry. In factories, supervisors may get dirty around machinery and materials and have to put up with noisy factory operations.

Some supervisors who have limited authority may feel isolated, neither a member of the work force nor an important part of management. On the other hand, supervisors have more challenging and prestigious jobs than most blue-collar workers.

Sources of Additional Information

A bibliography of career literature on management occupations is available from:

American Management Association, 135 West
50th St., New York, N.Y. 10020.

BROADCAST TECHNICIANS

(D.O.T. 194.168, .281, .282, and 782; 957.282; and 963.168 through .887)

Nature of the Work

Broadcast technicians operate and maintain the electronic equipment used to record and transmit radio and television programs. They work with microphones, sound recorders, light and sound effects, television cameras, video tape recorders, and other equipment.

In the control room, broadcast technicians operate equipment that regulates the quality of sounds and pictures being recorded or broadcast. They also operate controls that switch broadcasts from one camera or studio to another, from film to live programming, or from network to local programs. By means of hand signals and, in television, by use of telephone headsets, they give technical directions to personnel in the studio.

When events outside the studios are to be broadcast, technicians may go to the site and set up, test, and operate the equipment. After the broadcast, they dismantle the equipment and return it to the station.

As a rule, broadcast technicians in small stations perform a variety of duties. In large stations and in networks, on the other hand, technicians are more specialized, although specific job assignments may change from day to day. *Transmitter technicians* monitor and log outgoing signals and are responsible for transmitter operation. *Maintenance technicians* set up, maintain, and repair electronic broadcasting equipment. *Audio control technicians* regulate sound pickup, transmission, and switching, and *video control technicians* regulate the quality, brightness, and contrast of television pictures. The lighting of television programs is directed by *lighting technicians*. For programs originating outside the studio, *field technicians* set up and operate broadcasting equipment. *Recording technicians* operate and maintain sound recording equipment; *video recording technicians* operate and maintain video tape recording equipment. Sometimes the term "engineer" is substituted for "technician."

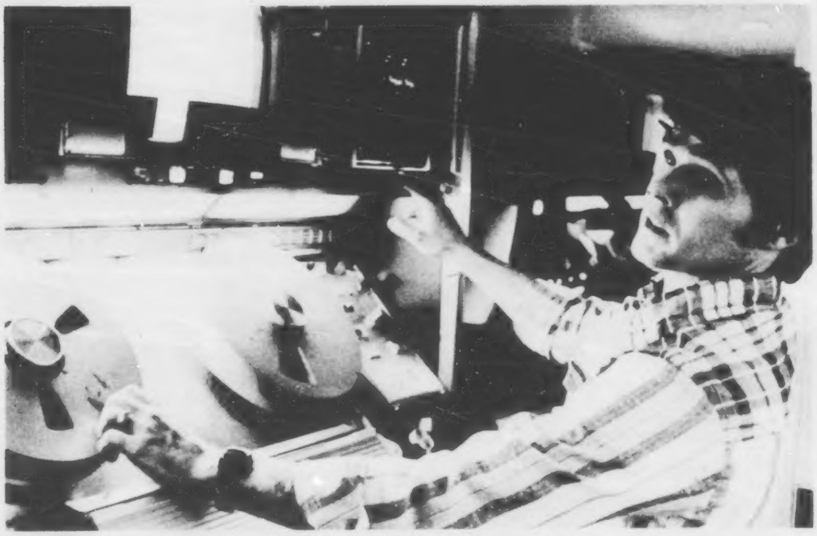
Places of Employment

About 22,500 broadcast technicians were employed in radio and television stations in 1976. Most radio stations employ fewer than four technicians, although a few large ones have more than 10. Nearly all television stations employ at least 10 broadcast technicians, and those in large metropolitan areas average about 30. In addition to the technicians, some supervisory personnel, with job titles such as chief engineer or director of engineering, work in engineering departments.

Although broadcast technicians are employed in every State, most are located in large metropolitan areas. The highest paying and most specialized jobs are concentrated in New York, Los Angeles, and Washington, D.C.—the originating centers for most of the network programs.

Training, Other Qualifications, and Advancement

A person interested in becoming a broadcast technician should plan to get a First Class Radiotelephone Operator License from the Federal Communications Commission (FCC). Federal law requires that anyone who operates broadcast transmitters in television stations must hold such a license. The law also requires that the chief engineer of a broadcasting station hold a first



Broadcast technician makes video tape recording on electronic equipment.

class license. The FCC issues a Third Class Operator License, too, and some stations require all their broadcast technicians to have one or the other of these licenses. Applicants for an FCC license must pass a series of written examinations. These cover construction and operation of transmission and receiving equipment; characteristics of electromagnetic waves; and regulations and practices, both Federal and international, which govern broadcasting.

Among high school courses, algebra, trigonometry, physics, electronics, and other sciences provide valuable background for persons anticipating careers in this occupation. Building and operating an amateur radio station also is good training. Taking an electronics course in a technical school is still another good way to acquire the knowledge for becoming a broadcast technician. Some persons gain work experience as temporary employees while filling in for regular broadcast technicians who are on vacation.

Many schools give courses especially designed to prepare the student for the FCC's first class license test. Technical school or college training is an advantage for those who hope to advance to supervisory positions or to the more specialized jobs in large stations and in the networks.

Persons with FCC first class licenses who get entry jobs are instructed and advised by the chief engineer or by other experienced technicians concerning the work procedures of the station. In small stations, they may start by operating the transmitter and handling other technical duties, after a brief instruction period. As they acquire more experience and skill they are assigned to more responsible jobs. Those who demonstrate above-average ability may move into top-level technical positions, such as supervisory technician or chief engineer. A college degree in engineering is becoming increasingly important for advancement to supervisory and executive positions.

Employment Outlook

People seeking beginning jobs as broadcast technicians face competition, especially in major metropolitan areas where the number of qualified jobseekers exceeds the number of openings. Job prospects may be better in smaller cities for people with appropriate training in electronics.

Employment of broadcast technicians is expected to increase about as fast as the average for all occupations through the mid-1980's. Most job openings, however, will result from the need to replace experienced technicians who retire, die, or transfer to other occupations.

Some new job opportunities for technicians will arise as new radio and television stations go on the air. Demand for broadcast technicians also will increase as cable television stations broadcast more of their own programs. At the same time, technological developments are likely to limit future demand; such laborsaving technical advances as automatic programming, automatic operation logging, and remote control of transmitters all hold down demand for additional technicians.

Earnings and Working Conditions

Salaries of beginning technicians in commerical radio and television ranged from about $155 to $215 a week in 1976 and those of experienced technicians from about $200 to $450, according to the limited information available. As a rule, technicians' wages are highest in large cities and in large stations. Technicians employed by television stations usually are paid more than those who work for radio stations because television work is generally more complex. Technicians employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most technicians in large stations work a 40-hour week with overtime pay for additional hours. Some broadcast technicians in the larger cities work a 37-hour week. In small stations, many technicians work 4 to 12 hours of overtime each week. Evening, night, and weekend work frequently is necessary since many stations are on the air as many as 24 hours a day, 7 days a week. Network technicians may occasionally have to work continuously for many hours and under great pressure in order to meet broadcast deadlines.

Technicians generally work indoors in pleasant surroundings. The work is interesting, and the duties are varied. When remote pickups are made, however, technicians may work out of doors at some distance from the studios, under less favorable conditions.

Sources of Additional Information

For information about radiotelephone operator's examinations, and guides to study for them, write to:

Federal Communications Commission, Washington, D.C. 20554.

For information on careers for broadcast technicians, write to:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

Corporation for Public Broadcasting, 1111 16th St. NW., Washington, D.C. 20036.

BUYERS

(D.O.T. 162.158 and 185.168)

Nature of the Work

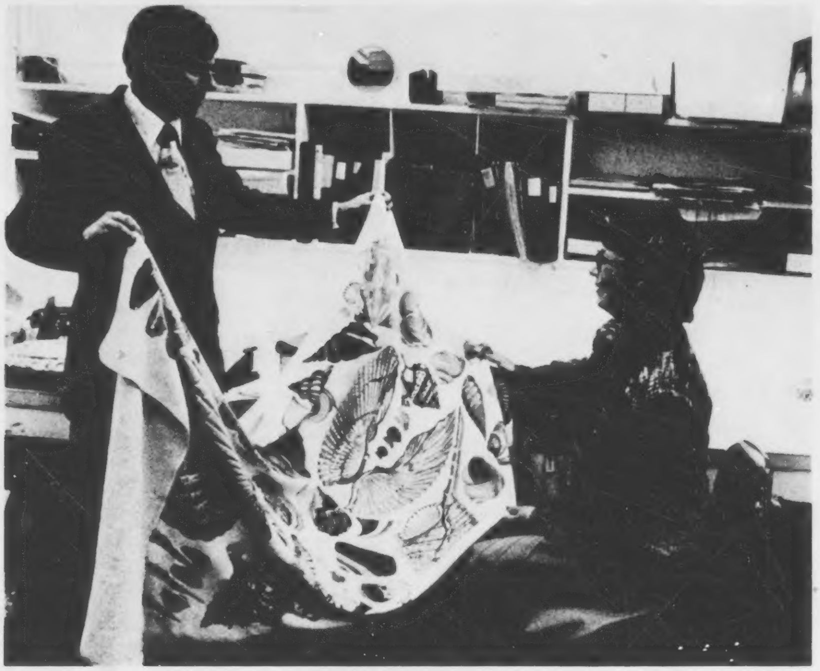
The Americans have been invited to a private showing in Paris. Representing a major New York department store, they sit with a select group in an elegantly furnished room. They watch closely as graceful models float down the runway before them to display the latest creations by the world's most famous designers. After some consultation, they make choices involving thousands, perhaps millions of dollars. All in a day's work.

The job of retail buyer often brings to mind the glamour of high fashion; indeed, many fashion buyers do lead exciting, fast-paced lives involving frequent travel abroad. Not every buyer, however, deals in fashion. All merchandise sold in a retail store—garden furniture, automobile tires, toys, aluminum pots, and canned soups alike—appears in that store on the decision of a buyer. Although all buyers seek to satisfy their stores' customers and sell at a profit, the kind and variety of goods they purchase depend on the store where they work. A buyer for a small clothing store, for example, may purchase its complete stock of merchandise from sportswear to formal evening clothes. Buyers who work for larger retail businesses often handle one or a few related lines of goods, such as men's wear, ladies' sportswear, or children's toys. Some, known as *foreign buyers*, purchase merchandise outside the United States.

In order to purchase the best selection of goods for their stores, buyers must be familiar with the manufacturers and distributors who handle the merchandise they need. They also must keep informed about changes in existing products and the development of new ones. To learn about merchandise, buyers attend fashion and trade shows and visit manufacturers' showrooms. They usually order goods during buying trips, and also place orders with wholesale and manufacturers' sales workers who call on them to display their merchandise.

Buyers must be able to assess the resale value of goods after a brief inspection and make a purchase decision quickly. They are aware of their stores' profit margins and try to select merchandise that will sell quickly at well above the original cost. Since most buyers work within a limited budget, they must plan their purchases to keep needed items always in stock but also allow for unexpected purchases when a "good buy" presents itself.

Because buyers purchase merchandise for their firms to resell (unlike purchasing agents who buy goods for direct use by the firm—see the statement on purchasing agents elsewhere in the *Handbook*), they must know what motivates customers to buy. Before ordering a particular line of merchandise, buyers study market research reports and analyze past sales records to determine what products are currently in demand. They also work closely with assistant buyers and sales clerks whose daily contact with customers furnishes information about consumer likes and dislikes. In addition, buyers read fashion and trade magazines to keep abreast of style and manufacturing trends; follow ads in newspapers and other media to check retail competitors' sales activities; and watch general economic conditions to anticipate consumer buying patterns.



Buyer in a large department store discusses quality of merchandise with manufacturer's representative.

Merchandise managers (D.O.T. 185.168) plan and coordinate buying and selling activities for large and medium-sized stores. They divide the budget among buyers, decide how much merchandise to stock, and assign each buyer to purchase certain goods. Merchandise managers may review buying decisions to insure that needed categories of goods are in stock, and help buyers to set general pricing guidelines.

Buyers and merchandise managers usually have very busy schedules and deal with many different people in the course of a day. They work with manufacturers' representatives, other store personnel including store executives and sales workers, and customers. Assisting with sales promotions and creating enthusiasm among sales personnel are part of the buyer's job, and he or she may be asked to provide information such as dress sizes and product descriptions to the advertising department for a sales promotion, or to meet with floor sales workers before a new line of merchandise is introduced. Some buyers direct assistants who handle routine aspects of purchasing such as verifying shipments; others supervise department managers.

Some buyers represent large stores or chains in cities where many manufacturers are located. The duties of these "market representatives" vary by employer; some purchase goods, while others supply information and arrange for store buyers to meet with manufacturers when they are in town.

New technology has altered the buyer's role in retail chain stores. In the past, firms employed a buyer for each store or group of stores in a local area. Now cash registers connected to a computer, known as point-of-sale terminals, allow retail chains to maintain centralized, up-to-the-minute inventory records. With these records, a single garden furniture buyer, for example, can purchase lawn chairs and picnic tables for the entire chain.

Places of Employment

In 1976, approximately 109,000 buyers and merchandise managers worked for retail firms. Although jobs for buyers are found in all parts of the country, most jobs are in major metropolitan areas where retail stores are concentrated. Market representatives work for buying offices in major market areas such as New York, Chicago, and Dallas.

Training, Other Qualifications, and Advancement

Distributive education programs at thousands of high schools have launched careers in retailing leading to a buyer's position. (Additional information on distributive education appears in the statement on retail trade sales workers elsewhere in the *Handbook*.) Indeed, many a good buyer began in a stockroom or behind a counter and worked up the ladder without any college training. However, new buyers will find a college degree increasingly necessary. Many junior and 4-year colleges offer programs in marketing and purchasing and confer thousands of degrees each year. In addition, numerous trade schools train students for careers in fashion merchandising. Courses in merchandising or marketing may help in getting a first job, but most employers accept graduates in any field of study and train them on the job.

Many stores, especially the larger ones, have formal training programs for management or executive trainees, including buyers. These programs usually last from 6 to 8 months and combine classroom instruction in merchandising and purchasing with short rotations to various jobs in the store. This training introduces the new worker to store operations and policies, and provides the fundamentals of merchandising and management as well.

The trainee's first job is likely to be that of assistant buyer. The duties include supervising sales workers, checking invoices on material received, and keeping account of stock on hand. Assistant buyers gradually assume purchasing responsibilities, depending upon their individual abilities and the size of the department where they work. Training as an assistant buyer usually lasts at least a year. After years of working as a buyer, those who show exceptional ability may advance to merchandise manager. A few find further promotion to top executive jobs such as general merchandise manager for a retail store or chain. The length of time it takes to reach any of these levels depends not just on the individual's ability but on the store's need for management personnel. The faster the company grows, the greater the opportunity for a worker to acquire responsibility.

Buyers should be good at planning and decisionmaking and have an interest in merchandising. They need leadership ability and communications skills to supervise sales workers and assistant buyers and to deal effectively with manufacturers' representatives and store executives. Because of the fast pace and constant pressure of their work, buyers need physical stamina and emotional stability.

Employment Outlook

Employment of buyers is expected to grow more slowly than the average for all occupations through the mid-1980's. Centralized buying is gaining popularity among chain stores, which are expected increasingly to dominate general merchandise retailing. Although anticipated growth of independent food stores should partially offset these trends, they will still reduce the number of openings for buyers. Most job openings will arise each year from the need to replace workers who leave the occupation. Competition for these jobs is expected to be keen, for merchandising attracts large numbers of college graduates every year. Prospects are likely to be best for qualified applicants who enjoy the competitive nature of retailing and work best in a demanding, fast-paced job.

Earnings and Working Conditions

Buyers for discount department stores and other mass merchandising firms are among the most highly paid in the industry, as are those who buy centrally for large chain department stores. Most earned between $15,000 and $25,000 a year in 1976, though many earned salaries outside this range. Merchandising managers earned considerably more. The actual income depends upon the product line purchased, the sales volume of the store, and the individual's seniority.

Buyers often earn large bonuses for exceptional performance. In addition, many stores have incentive plans, such as profit sharing and stock options.

Buyers regulate their own hours, and often work more than 40 hours a week because of special sales, conferences, and travel. The amount of traveling a buyer does varies with the type of merchandise bought and the location of suppliers, but most spend 4 or 5 days a month on the road. Merchandise managers also travel frequently, averaging several trips a month in many cases.

Sources of Additional Information

General information about a career in retailing is available from:

National Retail Merchants Association, 100 West 31st St., New York, N.Y. 10001.

Information on schools that teach retailing is available from:

United States Office of Education, Division of Vocational/Technical Education, Washington, D.C. 20202.

National Association of Trade and Technical Schools, 2021 L St. NW., Washington, D.C. 20036.

CHEMISTS

(D.O.T. 022.081, .168, .181, and.281)

Nature of the Work

The clothes we wear, the foods we eat, the houses in which we live—in

Many modern products, including plastics and other synthetics, have resulted from research in chemistry.

fact most things that help make our lives better, from medical care to a cleaner environment—result, in part, from the work done by chemists.

Chemists search for and put into practical use new knowledge about substances. They develop new compounds, such as rocket fuel; improve foods; and create clothing that is chemically treated against flammability, soil, and wrinkles.

Over one-half of all chemists work in research and development. In basic research, chemists investigate the properties and composition of matter and the laws that govern the combination of elements. Basic research often has practical uses. For example, synthetic rubber and plastics have resulted from research on small molecules uniting to form larger ones (polymerization). In research and development, new products are created or improved. The process of developing a product begins with descriptions of the characteristics it should have. If similar products exist, chemists test samples to determine their ingredients. If no such product exists, experimentation with various substances yields a product with the required specifications.

Nearly one-fifth of all chemists work in production and inspection. In production, chemists prepare instructions (batch sheets) for plant workers that specify the kind and amount of ingredients to use and the exact mixing time for each stage in the process. At each step, samples are tested for quality control to meet industry and government standards. Records and reports show results of tests.

Others work as marketing or sales representatives to obtain technical knowledge of products sold. A number of chemists teach in colleges and universities. Some chemists are consultants to private industry and to government agencies.

Chemists often specialize in one of the subfields of chemistry. *Analytical chemists* determine the structure, composition, and nature of substances, and develop new techniques. An outstanding example was the analysis of moon rocks by an international team of analytical chemists. *Organic chemists* at one time studied the chemistry of only living things, but this area has been broadened to include all carbon compounds. When combined with other elements, carbon forms a vast number of substances. Many modern commercial products, including plastics and other synthetics, have resulted from the work of organic chemists. *Inorganic chemists* study compounds other than carbon. They may, for example, develop materials to use in solid state electronic components. *Physical chemists* study energy transformations to find new and better energy sources. Increasingly, however, chemists consider themselves members of new specialties that include two of the preceding fields or more. *Biochemists*, often considered as either chemists or life scientists, are discussed elsewhere in the *Handbook*. Some chemists specialize in the chemistry of foods. (See statement on food scientists elsewhere in the *Handbook*.)

Places of Employment

Nearly 150,000 persons worked as chemists in 1976. About three-fifths of all chemists work in private industry, almost one-half of them in the chemical manufacturing industry. Most others work for companies manufacturing food, scientific instruments, petroleum, paper, and electrical equipment.

Colleges and universities employed 25,000 chemists in 1976. An equal number worked for State and local governments, primarily in health and agriculture, and for Federal agencies, chiefly the Department of Defense; Health, Education, and Welfare; Agriculture; and Interior. Smaller numbers worked for nonprofit research organizations.

Chemists are employed in all parts of the country, but they are concentrated in large industrial areas. Nearly one-fifth of all chemists were located in four metropolitan areas—New York, Chicago, Philadelphia, and Newark. About half worked in six States—New York, New Jersey, California, Pennsylvania, Ohio, and Illinois.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in chemistry or a related discipline is sufficient for many beginning jobs as a chemist. However, graduate training is required for many research and college teaching positions. Beginning chemists should have a broad background in chemistry, with good laboratory skills.

About 1,175 colleges and universities offer a bachelor's degree in chemistry. In addition to required courses in analytical, inorganic, organic, and physical chemistry, undergraduates usually study mathematics and physics.

More than 350 colleges and universities award advanced degrees in chemistry. In graduate school, students generally specialize in a particular subfield of chemistry. Requirements for the master's and doctor's degree usually include a thesis based on independent research.

Students planning careers as chemists should enjoy studying science and mathematics, and should like working with their hands building scientific apparatus and performing experiments. Perseverance and the ability to concentrate on detail and to work independently are essential. Other desirable assets include an inquisitive mind, and imagination. Chemists also should have good eyesight and eye-hand coordination.

Graduates with the bachelor's degree generally begin their careers in government or industry by analyzing or testing products, working in technical sales or service, or assisting senior chemists in research and development laboratories. Many employers have special training and orientation programs which are concerned with the special knowledge needed for the employer's type of work. Candidates for an advanced degree often teach or do research in colleges and universities while working toward advanced degrees.

Beginning chemists with the master's degree can usually go into applied research in government or private industry. They also may qualify for teaching positions in 2-year colleges and some universities.

The Ph. D. generally is required for basic research, for teaching in colleges and universities, and for advancement to many administrative positions.

Employment Outlook

Employment opportunities in chemistry are expected to be good for graduates at all degree levels through the mid-1980's. The employment of chemists is expected to grow about as fast as the average for all occupations during this period; thousands of new jobs will be created each year. In addition, several thousand openings will result each year as chemists retire, die, or transfer to other occupations.

This outlook for chemists is based on the assumption that research and development expenditures of government and industry will increase through the mid-1980's, although at a slower rate than during the 1960's. If actual expenditures differ significantly from those assumed, the outlook for chemists would be altered.

Approximately three-fourths of total employment is expected to be in private industry, primarily in the development of new products. In addition, industrial companies and government agencies will need chemists to help solve problems related to energy shortages, pollution control, and health care. Some also will work in Federal, State, and local crime laboratories.

Little growth in college and university employment is expected, and competition for teaching positions will be keen. (See statement on college and university teachers elsewhere in the *Handbook*.)

Some graduates will find openings in high school teaching after completing professional education courses and other requirements for a State teaching certificate. They usually are then regarded as teachers rather than chemists. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings and Working Conditions

Earnings of chemists averaged more than twice as much as those of nonsupervisory workers in private industry, except farming. According to the American Chemical Society, salaries of experienced chemists having a bachelor's degree averaged $21,200 a year in 1976; for those with a master's degree, $22,100; and for those with a Ph. D., $25,800.

Private industry paid chemists with the bachelor's degree starting salaries averaging $11,500 a year in 1976,; those with the master's degree, $13,600; and those with the Ph. D., $18,700.

In colleges and universities, the average salary of those with the master's degree was $17,000 and of those with the Ph. D., $21,000. In addition, many experienced chemists in educational institutions supplement their regular salaries with income from consulting, lecturing, and writing.

Depending on a person's college record, the annual starting salary in the Federal Government in 1977 for an inexperienced chemist with a bachelor's degree was either $9,303 or $11,523. Those who had 2 years of graduate study could begin at $14,097 a year. Chemists having the Ph. D. degree could start at $17,056 or $20,442. The average salary for all chemists in the Federal Government in 1977 was $19,900 a year.

Chemists usually work in modern, well-equipped, and well-lighted laboratories, offices, or classrooms. Some hazard is involved in handling potentially explosive or highly caustic chemicals. However, when safety regulations are followed, health hazards are negligible.

Sources of Additional Information

General information on career opportunities and earnings for chemists is available from:

American Chemical Society, 1155 16th St. NW., Washington, D.C. 20036.

Manufacturing Chemists Association, 1825 Connecticut Ave. NW., Washington, D.C. 20009.

For specific information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

For additional sources of information, see statements on biochemists, chemical engineers, food scientists, and the industrial chemical industry. Information on chemical technicians may be found in the statement on engineering and science technicians.

CHIROPRACTORS

(D.O.T. 079.108)

Nature of the Work

Chiropractic is a system of treatment based on the principle that a person's health is determined largely by the nervous system, and that interference with this system impairs normal functions and lowers resistance to disease. Chiropractors treat patients primarily by manual manipulation (adjustments) of parts of the body, especially the spinal column.

Because of the emphasis on the spine and its position, most chiropractors use X-rays to aid in locating the source of patients' difficulties. In addition to manipulation, most chiropractors use supplementary measures such as water, light, and heat therapy, and prescribe diet, exercise, and rest. Most State laws specify the types of supplementary treatment permitted in chiropractic. Chiropractors do not use drugs or surgery.

Places of Employment

About 18,000 persons, practiced chiropractic in 1976. Most chiropractors were in private practice. Some were salaried assistants of established practitioners or worked for chiropractic clinics. Others taught or conducted research at chiropractic colleges.

Chiropractors often locate in small communitees—about half of all active chiropractors work in cities of 50,000 inhabitants or less.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia regulate the practice of chiropractic and grant licenses to chiropractors who meet certain educational requirements and pass a State board examination. Although the type of practice permitted and the educational requirements for a license vary considerably from one State to another, most States require successful completion of a 4-year chiropractic course following 2 years of preprofessional college work. Some States require that specific subjects such as English, chemistry, biology, or physics be a part of this preprofessional work. In addition, several States require that chiropractors pass a basic science examination. Chiropractors licensed in one State often may obtain a license in other States by reciprocity.

Chiropractors treat patients primarily by manual manipulation (adjustments) of parts of the body, especially the spinal column.

In 1976, there were 13 chiropractic colleges. Four of these institutions were fully accredited by the Council on Chiropractic Education; four others were recognized candidates for accreditation and working toward accreditation. All require a minimum of 2 years of college before entrance, and most colleges require that courses in chemistry and biology be taken during these 2 years. By 1979, the Council on Chiropractic Education will approve only those schools which include courses in English and the social sciences. Chiropractic colleges emphasize courses in manipulation and spinal adjustments. Most offer a broader curriculum however, including subjects such as physiotherapy and nutrition. In most chiropractic colleges, the first 2 years of the curriculum include chiefly classroom and laboratory work in subjects such as anatomy, physiology, and biochemistry. During the last 2 years, students obtain practical experience in college clinics. The degree of Doctor of Chiropractic (D.C.) is awarded to students completing 4 years of chiropractic training.

Chiropractic requires a keen sense of observation to detect phyical abnormalities and considerable hand dexterity but not unusual strength or endurance. Persons desiring to become chiropractors should be able to work independently and handle responsibility. The ability to work with detail is important. Sympathy and understanding are among personal qualities considered desirable in dealing effectively with patients.

Most newly licensed chiropractors either set up a new practice or purchase an established one. Some start as salaried chiropractors to acquire experience and funds needed to establish their own practice. A moderate financial investment is usually necessary to open and equip an office.

Employment Outlook

Enrollments in chiropractic colleges have grown dramatically, partly in apparent response to the broader public acceptance of the profession. As more students graduate, new chiropractors may find it increasingly difficult to establish a practice in those areas where other practitioners already are located. The best opportunities for new chiropractors may be in small towns and in areas with comparatively few established practitioners.

Earnings and Working Conditions

In chiropractic, as in other types of independent practice, earnings are relatively low in the beginning. New graduates who worked as associates to established practitioners earned about $12,000 a year in 1976. Experienced chiropractors averaged about $25,000, according to limited data available, although many earn considerably more.

Sources of Additional Information

The State board of licensing in the capital of each State can supply information on State licensing requirements for chiropractors.

General information on chiropractic as a career is available from:

American Chiropractic Association, 2200 Grand Ave., Des Moines, Iowa 50312.

International Chiropractors Association, 741 Brady St., Davenport, Iowa 52808.

For a list of chiropractic colleges, as well as general information on chiropractic as a career, contact:

Council on Chiropractic Education, 3209 Ingersoll Street, Suite 206, Des Moines, Iowa 50312.

For information on requirements for admission to a specific chiropractic college, contact the admissions office of that school.

CITY MANAGERS

(D.O.T. 188.118 and 188.168)

Nature of the Work

Population growth and industrial expansion place increasing pressure on housing, transportation, and other facilities of cities. Problems associated with growing modern communities, such as air and water pollution and rising crime rates, also demand attention. To cope effectively with these problems, many communities hire a specialist in management techniques—the city manager.

A city manager usually is appointed by the community's elected officials and is responsible directly to them. Although duties vary by city size, city managers generally administer and coordinate the day-to-day operations of the city. They are responsible for functions such as tax collection and disbursement, law enforcement, and public works. They also hire department heads and their staffs and prepare the annual budget to be approved by elected officials. In addition, they study current problems, such as traffic congestion, crime, or urban renewal, and report their findings to the elected council.

City managers must plan for future growth and development of cities and surrounding areas. To provide for an expansion of public services, they frequently appear at civic meetings to advocate certain programs or to inform citizens of current government operations.

City managers work closely with planning departments to coordinate new and existing programs. In smaller cities that have no permanent planning staff, coordination may be done entirely by the manager.

To aid the city manager, many cities employ *management assistants*: assistant city managers, department head assistants, and administrative assistants. Under the manager's direction, management assistants administer programs, prepare reports, receive visitors, answer correspon-

A city manager often deals with members of the community.

dence, generally help to keep the city government functioning smoothly. Assistant city managers organize and coordinate city programs, supervise city employees, and act for the city manager upon occasion. They also may assume responsibility for some projects, such as the development of a preliminary annual budget. Department head assistants generally are responsible for one activity, such as personnel, finance, or law enforcement, but they also may assist in other areas. Administrative assistants, also called executive assistants or assistants to the city manager, usually do administrative and staff work in all departments under the city manager. For instance, they may compile operating statistics or review and analyze work procedures.

Places of Employment

About 3,000 city managers were employed in 1976. In addition, nearly 9,000 persons worked as administrative assistants, department head assistants, and assistant city managers. Most city managers worked for cities and counties that had a council-manager form of government. Under this type of government, an elected council appoints a manager who is responsible for the day-to-day operation of the government as well as for the hiring and firing of assistants, department heads, and other staff. Many other city managers worked for municipalities that had the mayor-council form of government, in which the mayor appoints the city manager as his or her chief administrative officer. A few city managers also worked for county governments, metropolitan or regional planning organizations, and councils of governments. All types of local governments employed management assistants, but larger jurisdictions generally employed them in greater numbers.

Although over three-quarters of all city managers work for small cities having less than 25,000 inhabitants, many larger cities also employ a city manager. About half of the cities having a population of between 10,000 and 500,000 have city managers. City managers work in all States, but one-half are concentrated in the eastern part of the Nation.

Training, Other Qualifications, and Advancement

A master's degree, preferably in public or business administration, is becoming essential for those seeking a career in city management. Although some applicants with only a bachelor's degree may find employment, strong competition for positions, even among master's degree recipients, will make the graduate degree a requirement for most entry level jobs. In some cases, employers may hire a person with training in a field related to public administration, such as engineering, recreation, social work, or political science.

In 1976, 185 colleges and universities offered graduate degree programs in public or municipal administration. Degree requirements in some schools include successful completion of an internship program in a city manager's office. During this internship period, which may last from 6 months to a year, the degree candidate observes local government operations and does research under the direct supervision of the city manager.

Nearly all city managers begin as management assistants. Most new graduates work as administrative assistants to city managers for several years to gain experience in solving urban problems, coordinating public services, and applying management techniques. Others work in a government department such as finance, public works, or public planning. They may acquire supervisory skills and additional experience by working as assistant city manager or department head assistant. City managers often are first employed in small cities, but during their careers they may work in several cities of increasing size.

Persons who plan a career in city management should like to work with detail and to be a part of a team. They must have sound judgment, self-confidence, and the ability to perform well under stress. To handle emergency situations, city managers must quickly isolate problems, identify their causes, and provide a number of possible solutions. City managers should be tactful and able to communicate and work well with people.

City managers also must be dedicated to public service since they often put in long, hard hours in times of crisis.

Employment Outlook

Employment of city managers and local government management assistants is expected to expand faster than the average for all occupations through the mid-1980's as management of our governments becomes more complex. Examples of more sophisticated management techniques include computerized tax and utility billing, electronic traffic control, and application of systems analysis to urban problems. The demand for city managers also will increase as more cities convert to the council-manager form of government, currently the fastest growing form of city government. Furthermore, city managers and management assistants will be employed by other types of local government to help elected officials with day-to-day operations of government. Increased emphasis on regional solutions to urban problems should result in additional job opportunities for city managers and management assistants in councils of government.

Persons who seek beginning management assistant jobs may face strong competition through the mid-1980's, especially if they do not have a graduate degree in public administration or related management experience. Competition should be keen among the growing number of administrative assistants, department head assistants, and assistant city managers for the relatively few city manager positions. However, many of those unable to find employment in this area should find jobs in other fields of public administration.

Earnings and Working Conditions

Salaries of city managers and management assistants vary according to education, experience, job responsibility, and city size. Generally, city managers' earnings are very high relative to the average earnings for nonsupervisory workers in private industry, except farming. In 1976, average annual salaries of city managers ranged from about $20,000 in cities of 5,000 inhabitants to more than $40,000 in cities of over 100,000 inhabitants, according to the International City Management Association. The average annual salary for all city managers was more than $23,000. City managers in cities not having council-manager governments received slightly less.

Salaries of management assistants averaged $17,000 in 1976, and ranged from about $12,000 in small cities to more than $20,000 in large ones. Salaries of assistant city managers generally were higher than those of other management assistants.

City managers often work more than 40 hours a week. Emergency problems may require evening and weekend work and meetings with individuals and citizen's groups consume additional time.

Fringe benefits usually include health and life insurance programs, pension plans, sick leave, vacation time, and often a car for official business. Managers generally are reimbursed for expenses incurred while attending professional meetings and seminars.

Sources of Additional Information

For information on a career in city management, contact:

International City Management Association,
1140 Connecticut Ave. NW., Washington, D.C. 20036.

CLAIM REPRESENTATIVES

(D.O.T. 168.288, 241.168, and 249.268)

Nature of the Work

Claims adjuster gathering evidence in investigating a claim.

Fast and fair settlement of all claims is essential to any insurance company if it is to meet its commitments to policyholders and also protect its own financial well-being. The people who investigate claims, negotiate settlement with policyholders, and authorize payment are known as claim representatives—a group that includes claim adjusters and claim examiners.

When a property-liability (casualty) insurance company receives a claim, the *claim adjuster* determines whether the policy covers it and the amount of the loss. Adjusters use reports, physical evidence, and testimony of witnesses in investigating a claim. When their company is liable, they negotiate with the claimant and settle the case.

Adjusters must make sure that settlements are in line with the real extent of the loss. They must protect their company from false or inflated claims but, at the same time, settle valid claims fairly and promptly. Some adjusters are allowed to issue checks on company funds; most, however, submit their findings to claim examiners who review them to insure that proper procedures have been followed and then authorize payment.

Some adjusters work with all lines of insurance. Others specialize in claims from property damage by fire, marine loss, automobile damage, workers' compensation loss, or product liability. Several States have "no-fault" automobile insurance plans that relieve the adjuster from determining responsibility for a loss. Adjusters in these States still must decide the amount of loss, however. A growing number of casualty companies employ special claims people to settle small claims, usually minor automobile or homeowner damage claims. These claim workers, generally called "inside adjusters" or "telephone adjusters," contact claimants by telephone or mail and have the policyholder send repair costs, medical bills, and other statements to the company. Many companies centralize this operation in a drive-in claims center where the cost of repair is determined and a check is issued on the spot.

Adjusters work away from the office most of the time. They may be called to the site of an accident or to the location of a fire or burglary. Adjusters make their own schedules of the activities needed to dispose of a claim properly. They also keep written or taped records of information obtained from witnesses and other sources and prepare reports of their findings.

In life insurance companies, the counterpart of the claim adjuster is the *claim examiner*, who investigates the details surrounding questionable claims or those exceeding a specified amount. They may check claim applications for completeness and accuracy, interview medical specialists, consult policy files to verify information on a claim, or calculate benefit payments. Generally, examiners are authorized to investigate and approve payment on all claims up to a certain limit; larger claims are referred to a senior examiner.

Examiners checking incorrect or questionable claims may correspond with investigating companies, field managers, agents, or the family of the insured. Claim examiners occasionally travel to obtain information by personal interview, or contact State insurance departments and other insurance companies. In addition to verifying claims and approving payment, examiners also maintain records of settled claims and prepare reports to be submitted to their company's data processing department. Some experienced examiners serve on committees, conduct surveys of claim practices within their company, and help devise more efficient ways to process claims. They, like claim adjusters, sometimes testify in court on contested claims.

Places of Employment

About 155,000 persons worked as claim representatives in 1976.

The majority of claim adjusters worked for insurance companies that sell property and liability coverage. Some were employed by independent adjusting firms that contract their services for a fee. These independent firms range from national companies employing hundreds of adjusting specialists to small 3- or 4-person local operations. A relatively small number of adjusters represent the insured rather than the insurance company. These "public adjusters" usually are retained by banks, financial organizations, and other business firms to handle fire and other losses to property. They negotiate claims against insurance companies and deal with adjusters for such companies.

Most claim examiners worked for life insurance companies in large cities such as New York, San Francisco, Chicago, Dallas, and Philadelphia, where most home offices are located.

Adjusters may travel to almost any area of the United States, since claims must be settled locally. Occasionally, an experienced adjuster may travel to the scene of a disaster, such as a hurricane or a riot, to work with local personnel. Some cases result in travel outside the United States.

Training, Other Qualifications, and Advancement

Although a growing number of insurance companies prefer claim representatives to have a college degree, many hire those without college training, particularly if they have specialized experience. For example, persons experienced in automobile repair work may qualify as auto adjusters, and those with clerical work experience might be hired as inside adjusters.

No specific field of college study is recommended. Although courses in insurance, economics, or other business subjects are helpful, a major in almost any college field is adequate preparation. An adjuster who has a business or accounting background might specialize in loss from business interruption or damage to merchandise. Those with college training in engineering will find their education helpful in adjusting industrial claims. A legal background is most helpful to those handling workers' compensation and product liability cases.

Most large insurance companies provide beginning claim adjusters and examiners on-the-job training and home study courses. Claim representatives are encouraged to take courses designed to enhance their professional skills. For example, the Insurance Institute of America offers a six-semester study program leading to an associate degree in claims adjusting upon successful completion of six examinations. Adjusters can prepare for these examinations by independent home study or through company or public classes. A professional Certificate in Insurance Adjusting also is available from the College of Insurance in New York City.

The Life Office Management Association (LOMA) in cooperation with the International Claim Association offers a claims education program for life and health examiners. The program is part of the LOMA Institute Insurance Education Program leading to the professional designation, FLMI (Fellow, Life Management Institute) upon successful completion of eight written examinations.

About three-fourths of the States require adjusters to be licensed. Despite wide variation in State licensing requirements, applicants usually must comply with one or more of the following: Pass a written examination covering the fundamentals of adjusting; furnish character references; be 20 or 21 years of age and a resident of the State; offer proof that they have completed an approved course in insurance or loss adjusting; and file a surety bond.

Because they often work closely with claimants, witnesses, and other insurance professionals, representatives must be able to adapt to many different persons and situations. They should be able to communicate effectively and gain the respect and cooperation of people from different backgrounds. For example, when adjusters' evaluations of claims differ from those of the persons who have suffered the loss, they should be able to explain their conclusions tactfully. Examiners need to be familiar with medical and legal terms and practices and Federal and State insurance laws and regulations. Because they may have to check premium payments, policy values, and other numerical items in processing a claim, examiners should be adept at making mathematical calculations. Both adjusters and examiners should have a good memory and enjoy working with details.

Beginning adjusters and examiners work on small claims under the supervision of an experienced worker. As they learn more about claim investigation and settlement, they are assigned claims that are higher in loss value and more difficult. Trainees are promoted as they demonstrate competence in handling assignments and progress in the courses they take. Because of the complexity of insurance regulations and claims procedures, workers who lack formal academic training may advance more slowly than those with 2 years or more of college. Employees who show unusual competence in claims work or outstanding administrative skills may be promoted to department supervisor in a field office or to a managerial position in the home office. Qualified adjusters and examiners sometimes transfer to other departments, such as underwriting or sales.

Employment Outlook

Employment of claim representatives is expected to grow about as fast as the average for all occupations through the mid-1980's as the number of insurance claims continues to increase. In addition to jobs created by growth of the occupation, many others will result from the need to replace workers who die, retire, or transfer to other jobs.

Several factors point to a growing volume of insurance and a resulting need for claim adjusters. Over the next decade a steadily rising number of workers will be entering their most productive years. These workers and their families are likely to seek insurance protection as they purchase homes, automobiles, and other consumer durables. New or expanding businesses will need protection for new plants and equipment and for insurance covering their employees' health and safety. As more people live and work in densely populated areas, the increased risk of automobile accident, fire, or theft should result in a greater number of claims.

As ways of doing business continue to change, the demand for certain kinds of claim adjusters will be stronger than for others. For example, the growing trend toward drive-in claim centers and claim handling by telephone should reduce the demand for automobile adjusters while it stimulates demand for inside adjusters. Independent adjusters who specialize in automobile damage claims should continue to suffer some loss of business. Prospects should be very good, however, for adjusters who specialize in highly complex types of business insurance such as marine cargo, workers' compensation, and product liability.

A similar situation exists for claim examiners. Employment of examiners in casualty companies should rise about as fast as for adjusters; however, much slower growth is expected for life insurance examiners as increased use of computers enables them to process more claims, especially routine ones and those that arise under group policies.

Earnings and Working Conditions

According to a recent survey of property and liability companies, claim adjusters averaged about $13,000 a year in 1976; inside adjusters earned average salaries of about $9,900. Most public adjusters are paid a percentage of the amount of the settlement—generally 10 percent. Adjusters are furnished a company car or are reimbursed for use of their own vehicles for business purposes. Salaries of claim adjusters are about one and one-half times the average earnings for all nonsupervisory workers in private industry, except farming; salaries of inside adjusters are slightly above the average for all nonsupervisory work

A survey of life insurance companies by the Life Office Management Association revealed that claim examiners earned average salaries of $13,300 a year in 1976. According to the survey of property and liability companies, casualty claim examiners averaged $15,280. Claim supervisors in casualty companies and life companies averaged $17,300 a year. Claim examiners earn more than 1 1/2 times the average for all nonsupervisory workers in private industry, except farming.

Claim adjusting is not a desk job. It requires that a person be physically fit because much of the day may be spent in traveling from one place to another, walking about outdoors, and climbing stairs. Adjusters may have to work evenings or weekends in order to interview witnesses and claimants when they are available. Since most companies provide 24-hour claim service to their policyholders, some adjusters always must be on call. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Claim examiners have desk jobs that require no unusual physical activity. Although the average workweek for examiners is 35 to 40 hours, they may work longer at times of peak claim loads or when quarterly and annual statements are prepared. They also may need to travel occasionally.

Sources of Additional Information

General information about a career as a claim examiner or adjuster is available from the home offices of many life and property and liability insurance companies.

Information about licensing requirements for claim adjusters may be obtained from the department of insurance in each State.

Information about career opportunities in these occupations also may be obtained from:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

American Mutual Insurance Alliance, 20 N. Wacker Dr., Chicago, Ill. 60606.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

For information about public insurance adjusting, contact:

National Association of Public Adjusters, 1613 Munsey Building, Baltimore, Md. 21202.

Career information on life insurance claim examining is available from:

American Council of Life Insurance, 1850 K St., NW., Washington, D.C. 20006.

CLERGY

Deciding on a career in the clergy involves considerations different from those involved in other career choices. When persons choose to enter the ministry, priesthood, or rabbinate, they do so primarily because they possess a strong religious faith and a desire to help others. Nevertheless, it is important to know as much as possible about the profession and how to prepare for it, the kind of life it offers, and its needs for personnel.

The number of clergy needed depends largely on the number of people who participate in organized religious groups. This affects the number of churches and synagogues established and pulpits to be filled. In addition to the clergy who serve congregations, many others teach or act as administrators in seminaries and in other educational institutions; still others serve as chaplains in the Armed Forces, industry, correctional institutions, hospitals, or on college campuses; or render service as missionaries or in social welfare agencies.

Persons considering a career in the clergy should seek the counsel of a religious leader of their faith to aid in evaluating their qualifications. The most important of these are a deep religious belief and a desire to serve the spiritual needs of others. The priest, minister, or rabbi also is expected to be a model of moral and ethical conduct. A person considering one of these fields must realize that the civic, social, and recreational activities of a member of the clergy often are influenced and restricted by the customs and attitudes of the community.

The clergy should be sensitive to the needs of others and able to help them deal with these needs. The job demands an ability to speak and write effectively, to organize, and to supervise others. The person entering this field also must enjoy studying because the ministry is an occupation which requires continuous learning. In addition, the ministry demands considerable initiative and self-discipline.

More detailed information on the clergy in the three largest faiths in the United States—Protestant, Roman Catholic, and Jewish—is given in the following statements, prepared in cooperation with leaders of these faiths. Information on the clergy in other faiths may be obtained directly from leaders of the respective groups.

PROTESTANT MINISTERS

(D.O.T. 120.108)

Nature of the Work

Protestant ministers lead their congregations in worship services and administer the rites of baptism, confirmation, and Holy Communion. They prepare and deliver sermons and give religious instruction to persons who are to become new members of the church. They also perform marriages; conduct funerals; counsel individuals who seek guidance; visit the sick, aged, and handicapped at home and in the hospital; comfort the bereaved; and serve church members in other ways. Many Protestant ministers write articles for publication, give speeches, and engage in interfaith, community, civic, educational, and recreational activities sponsored by or related to the interests of the church. Some ministers teach in seminaries, colleges, and universities.

The services that ministers conduct differ among Protestant denominations and also among congregations within a denomination. In many denominations, ministers follow a traditional order of worship; in others they adapt the services to the needs of youth and other groups within the congregation. Most services include Bible reading, hymn singing, prayers, and a sermon. In some denominations, Bible reading by a member of the congregation and individual testimonials may constitute a large part of the service.

Ministers serving small congregations generally work on a personal basis with their parishioners. Those serving large congregations have greater administrative responsibilities, and spend considerable time working with committees, church officers, and staff, besides performing their other duties. They may have one or more associates or assistants who share specific aspects of the ministry, such as a minister of education who assists in educational programs for different age groups, or a minister of music.

The services that ministers conduct differ among Protestant denominations and also among congregations within a denomination.

Places of Employment

In 1976, about 190,000 ministers served more than 72 million Protestants. Most ministers serve individual congregations. In addition, however, thousands of ministers work in closely related fields such as chaplains in hospitals and the Armed Forces. The greatest number of clergy are affiliated with the five largest groups of churches—Baptist, United Methodist, Lutheran, Presbyterian, and Episcopal.

All cities and most towns in the United States have at least one Protestant church with a full-time minister. Some churches employ part-time ministers; many part-time clergy are seminary students or ministers retired from full-time pastoral responsibilities. Although most ministers are located in urban areas, many live in less densely populated areas where they may serve two congregations or more.

Training and Other Qualifications

Educational requirements for entry into the Protestant ministry vary greatly. Some denominations have no formal educational requirements, and others ordain persons having varying amounts and types of training in Bible colleges, Bible institutes, or liberal arts colleges.

In 1976, there were 138 American theological institutes accredited by the Association of Theological Schools in the United States and Canada. These admit only students who have received a bachelor's degree or its equivalent with a liberal arts major from an accredited college. Many denominations require a 3-year course of professional study in one of these accredited schools or seminaries after college graduation. The degree of master of divinity is awarded upon completion.

Recommended preseminary or undergraduate college courses include English, history, philosophy, the natural sciences, social sciences, the fine arts, music, religion, and foreign languages. These courses provide a knowledge of modern social, cultural, and scientific institutions and problems. However, students considering theological study should contact, at the earliest possible date, the schools to which they intend to apply, to learn how to prepare for the program they expect to enter.

The standard curriculum for accredited theological schools consists of four major categories: biblical, historical, theological, and practical. Courses of a practical nature such as psychology, religious education, and administration are emphasized. Many accredited schools require that students gain experience in church work under the supervision of a faculty member or experienced minister. Some institutions offer doctor of ministry degrees to students who have completed 1 year or more of additional study after serving at least a year as minister. Scholarships and loans are available for students of theological institutions.

In general, each large denomination has its own school or schools of theology that reflect its particular doctrine, interests, and needs. However, many of these schools are open to students from other denominations. Several interdenominational schools associated with universities give both undergraduate and graduate training covering a wide range of theological points of view. Persons who have denominational qualifications for the ministry usually are ordained after graduation from a seminary. In denominations that do not require seminary training, clergy are ordained at various appointed times. Men and women entering the clergy often begin their careers as pastors of small congregations or as assistant pastors in large churches.

Employment Outlook

The trend toward merger and unity among denominations, combined with the closing of smaller parishes and the downturn in financial support, has reduced demand for Protestant ministers in recent years. As a result, new graduates of theological schools will face increasing competition in finding positions. The supply-demand situation will vary among denominations and the chance of obtaining employment will depend, in part, on the length of the candidate's formal preparation. Most of the openings for clergy that are expected through the mid-1980's will therefore result from the need to replace those in existing positions who retire, die, or leave the ministry. The need for ministers in Evangelical churches, however, is expected to continue to grow.

Although fewer opportunities may arise for Protestant ministers to serve individual congregations, newly ordained ministers may find work in youth, family relations, and welfare organizations; religious education; and as chaplains in the Armed Forces, hospitals, universities, and correctional institutions.

Earnings and Working Conditions

Salaries of Protestant clergy vary substantially, depending on age, experience, education, denomination, size and wealth of congregation, type of community, and geographic location. According to a study by the Institute for Church Development, average income including benefits for Protestant ministers in five denominations was about $13,650 in 1976. These earnings are somewhat higher than the average for Protestant denominations as a whole. Annual vacations average 3 weeks and there often is opportunity for time off.

Because of the wide range of service that the minister provides, he or she may work long or irregular hours, often involving considerable travel.

Sources of Additional Information

Persons who are interested in entering the Protestant ministry should seek the counsel of a minister or church guidance worker. Each theological school can supply information on admission requirements. Prospective ministers also should contact the ordination supervision body of their particular denomination for information on special requirements for ordination.

RABBIS

(D.O.T. 120.108)

Nature of the Work

Rabbis are the spiritual leaders of their congregations and teachers and interpreters of Jewish law and tradition. They conduct religious services and deliver sermons at services on the Sabbath and on Jewish holidays. Rabbis customarily are available at all times to counsel members of their congregation, other followers of Judaism, and the community at large. Like other clergy, rabbis conduct weddings and funeral services, visit the sick, help the poor, comfort the bereaved, supervise religious education programs, engage in interfaith activities, and involve themselves in community affairs.

Rabbis serving large congregations may spend considerable time in ad-

Rabbi instructing nursery school children about the Friday evening Sabbath meal.

ministrative duties, working with their staffs and committees. Large congregations frequently have an associate or assistant rabbi. Many assistant rabbis serve as educational directors.

Nearly all rabbis serve Orthodox, Conservative, or Reform congregations. Regardless of their particular point of view, all Jewish congregations preserve the substance of Jewish religious worship. The congregations differ in the extent to which they follow the traditional form of worship—for example, in the wearing of head coverings, the use of Hebrew as the language of prayer, or the use of music or a choir. The format of the worship service and, therefore, the ritual that the rabbis use may vary even among congregations belonging to the same branch of Judaism.

Rabbis also may write for religious and lay publications, and teach in theological seminaries, colleges, and universities.

Places of Employment

About 4,000 rabbis served over 6 million followers of the Jewish faith in this country in 1976; approximately 1,550 were Orthodox rabbis, 1,350 were Conservative, and 1,200 Reform. Others work as chaplains in the military services, in hospitals and other institutions, or in one of the many Jewish community service agencies. A growing number are employed in colleges and universities as teachers in Jewish Studies programs.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in those States that have large Jewish populations, particularly New York, California, Pennsylvania, New Jersey, Illinois, Massachusetts, Florida, Maryland, and the Washington, D.C. metropolitan area.

Training and Other Qualifications

To become eligible for ordination as a rabbi, a student must complete a prescribed course of study in a seminary. Entrance requirements and the curriculum depend upon the branch of Judaism with which the seminary is associated.

Nearly 30 seminaries train Orthodox rabbis in programs of varying lengths. The required course of study to prepare for ordination is usually 3 or 4 years. However, students who are not college graduates may spend a longer period at these seminaries and complete the requirements for the bachelor's degree while pursuing the rabbinic course. Some Orthodox seminaries do not require a college degree to qualify for ordination, although students who qualify usually have completed 4 years of college.

The Hebrew Union College—Jewish Institute of Religion is the official seminary that trains rabbis for the Reform branch of Judaism. It is the only branch that has approved the training and ordination of women as rabbis. In 1976, almost half the entering class at the Reform seminary were women. The Jewish Theological Seminary of America is the official seminary that trains rabbis for the Conservative branch of Judaism. Both seminaries require the completion of a 4-year college course, as well as earlier preparation in Jewish studies, for admission to the rabbinic program leading to ordination. Normally 5 years of study are required to complete the rabbinic course at the Reform seminary, including 1 year of preparatory study in Jerusalem. Exceptionally well-prepared students can shorten this 5-year period to a minimum of 3 years. A student having a strong background in Jewish studies can complete the course at the Conservative seminary in 4 years; for other enrollees, the course may take as long as 6 years.

In general, the curriculums of Jewish theological seminaries provide students with a comprehensive knowledge of the Bible, Talmud, Rabbinic literature, Jewish history, theology, and courses in education, pastoral psychology, and public speaking. Students of the Reform seminary get a thorough preparation in the classics as well as extensive practical training in dealing with the social and political problems in the community. Training for alternatives to the pulpit, such as leadership in community services and religious education, increasingly is stressed.

Some seminaries grant advanced academic degrees in fields such as Biblical and Talmudic research. All Jewish theological seminaries make scholarships and loans available.

Newly ordained rabbis usually begin as leaders of small congregations, assistants to experienced rabbis, directors of Hillel Foundations on college campuses, teachers in seminaries and other educational institutions, or chaplains in the Armed Forces. As a rule, the pulpits of large and well-established Jewish congregations are filled by experienced rabbis.

Employment Outlook

The demand for Rabbis has declined in recent years because some established congregations have closed and fewer new ones are being formed. As a result, many newly ordained Rabbis will take positions in smaller Jewish communities and as assistant Rabbis in larger Jewish congregations. Opportunities still exist for Rabbis to teach in colleges and universities, to serve as chaplains in the Armed Forces, and to work in hospitals and other institutions or in one of the many Jewish social service agencies. Openings in established congregations will come largely from a need to replace those Rabbis who retire or die.

The employment outlook for rabbis varies among the three major branches of Judaism, however. Reform rabbis may face some competition for available positions and Orthodox clergy are expected to encounter very keen competition. Conservative rabbis, on the other hand, will have good employment opportunities, if present trends continue.

Earnings and Working Conditions

Incomes vary depending on the size and financial status of the congregation as well as its denominational branch and geographic location. Rabbis usually earn additional income from gifts or fees for officiating at ceremonies such as weddings.

In 1976 the annual earnings of rabbis averaged between $15,000 and $20,000, including pension and housing allowance. Earnings of Orthodox rabbis tended to be at the lower end of the scale. Average earnings of newly ordained Conservative and Reform rabbis were about $19,000; more experienced rabbis earned much higher salaries and, with other benefits, averaged as much as $35,000 a year. Some senior rabbis in large temples earned up to $60,000 a year.

Rabbis' working hours are determined by their role in the congregation. Besides conducting regular religious services, they also may spend considerable time in administrative, educational, and community service functions, as well as presiding over various ceremonial services. Rabbis also must be available to serve the emergency needs of their congregation members.

Sources of Additional Information

Persons who are interested in becoming rabbis should discuss their plans for a vocation with a practicing rabbi. Information on the work of rabbis and allied occupations can be obtained from:

The Jewish Theological Seminary of America, (Conservative), 3080 Broadway, New York, New York 10027.

The Rabbi Issac Elchanan Theological Seminary, an affiliate of Yeshiva University, (Orthodox), 2540 Amsterdam Ave., New York, N.Y. 10033.

Hebrew Union College and Jewish Institute of Religion, (Reform), whose three campuses are located at 40 W. 68th St., New York, N.Y. 10023; at 3101 Clifton Ave., Cincinnati, Ohio 45220; and at 3077 University Mall, Los Angeles, Calif. 90007.

ROMAN CATHOLIC PRIESTS

(D.O.T. 120.108)

Nature of the Work

Roman Catholic priests attend to the spiritual, pastoral, moral, and educational needs of the members of their church. Their duties include presiding at liturgical functions; offering religious enlightenment in the form of a sermon; hearing confessions; administering the Sacraments (including the sacraments of Marriage and Penance); and conducting funeral services. They also comfort the sick, console relatives and friends of the dead, counsel those in need of guidance, and assist the poor.

The number of priests has been insufficient to fill all the needs of Catholic institutions.

Priests spend long hours working for the church and the community. Their day usually begins with morning meditation and Mass, and may end with the hearing of confessions or an evening visit to a hospital or a home. Many priests direct and serve on church committees, work in civic and charitable organizations, and assist in community projects.

There are two main classifications of priests—diocesan (secular) and religious. Both types have the same powers acquired through ordination by a bishop. The differences lie in their way of life, the type of work to which they are assigned, and the church authority to whom they are immediately subject. Diocesan priests generally work as individuals in parishes assigned to them by the bishop of their diocese. Religious priests generally work as part of a religious order, such as the Jesuits, Dominicans, or Franciscans. They engage in specialized activities such as teaching or missionary work assigned to them by superiors of their order.

Both religious and diocesan priests hold teaching and administrative posts in Catholic seminaries, colleges and universities, and high schools. Priests attached to religious orders staff a large proportion of the institutions of higher education and many high schools, whereas diocesan priests are usually concerned with the parochial schools attached to parish churches and with diocesan high schools. The members of religious orders do most of the missionary work conducted by the Catholic Church in this country and abroad.

Places of Employment

Approximately 59,000 priests served nearly 49 million Catholics in the United States in 1976. There are priests in nearly every city and town and in many rural communities. The majority are in metropolitan areas, where most Catholics reside. Catholics are concentrated in the Northeast and Great Lakes regions, with smaller concentrations in California, Texas, and Louisiana. Large numbers of priests are located in communities near Catholic educational and other institutions.

Training and Other Qualifications

Preparation for the priesthood generally requires 8 years of study beyond high school. There are over 450 seminary institutions where students may receive training for the priesthood. Preparatory study may begin in the first year of high school, at the college level, or in theological seminaries after college graduation.

High school seminaries provide a college preparatory program that emphasizes English grammar, speech, literature, and social studies. Some study of Latin is required and the study of modern language is encouraged. The seminary college offers a liberal arts program, stressing philosophy and religion; the study of man through the behavioral sciences and history; and the natural sciences and mathematics. In many college seminaries, a student may concentrate in any of these fields.

The remaining 4 years of preparation include sacred scripture; dogmatic, moral, and pastoral theology; homiletics (art of preaching); church history; liturgy (Mass); and canon law. Field work experience usually is required in addition to classroom study; in recent years this aspect of a priest's training has been emphasized. Diocesan and religious priests attend different major seminaries, where slight variations in the training reflect the differences in the type of work expected of them as priests. Priests are not permitted to marry.

Postgraduate work in theology is offered at a number of American Catholic universities or at ecclesiastical universities around the world, particularly in Rome. Also, many priests do graduate work at other universities in fields unrelated to theology. Priests are encouraged by the Catholic Church to continue their studies, at least informally, after ordination. In recent years continuing education for ordained priests has stressed social sciences, such as sociology and psychology.

Young men never are denied entry into seminaries because of lack of funds. In seminaries for secular priests, the church authorities may make arrangements for student scholarships or loans. Those in religious seminaries are financed by contributions of benefactors.

The first assignment of a newly ordained secular priest is usually that of assistant pastor or curate. Newly ordained priests of religious orders are assigned to the specialized duties for which they are trained. Depending on the talents, interests, and experience of the individual, many opportunities for greater responsibility exist within the church.

Employment Outlook

A growing number of priests will be needed in the years ahead to provide for the spiritual, educational, and social needs of the increasing number of Catholics in the Nation. The number of ordained priests has been insufficient to fill the needs of newly established parishes and other Catholic institutions, and to replace priests who retire or die. This situation is likely to persist and perhaps worsen, if the recent drop in seminary enrollments continues. However, permanent deacons, who may marry and hold full-time jobs outside the Church, are being ordained as Catholic ministers to preach and perform other liturgical functions, such as communion and baptism. They are not permitted to celebrate Mass or hear confession. Although priests usually continue to work longer than persons in other professions, the varied demands and long hours create a need for young priests to assist the older ones. Also, an increasing number of priests have been acting in many diverse areas of service—in social work; religious radio, newspaper, and television work; and labor-management mediation. They also have been serving in foreign posts as missionaries, particularly in countries that have a shortage of priests.

Earnings and Working Conditions

Diocesan priests' salaries vary from diocese to diocese and range from $2,000 to $6,000 a year. The diocesan priest also may receive a car allowance of $25 to $50 a month, free room and board in the parish rectory, and fringe benefits such as group insurance and retirement benefits in the diocese.

Religious priests take a vow of poverty and are supported by their religious order.

Priests who do special work related to the church, such as teaching, usually receive a partial salary which is less than a lay person in the same position would receive. The difference between the usual salary for these jobs and the salary that the priest receives is called "contributed service." In some of these situations, housing and related expenses may be provided; in other cases, the priest must make his own arrangements. Some priests doing special work may receive the same compensation that a lay person would receive. These may include priests working as lawyers, counselors, consultants, etc.

Due to the wide range of duties which most clergy have, priests often must work long and irregular hours. Their working conditions vary widely with the type and area of assignment.

Sources of Additional Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priest. For information regarding the different religious orders and the secular priesthood, as well as a list of the seminaries which prepare students for the priesthood, contact the diocesan Directors of Vocations through the office of the local pastor or bishop.

COLLEGE STUDENT PERSONNEL WORKERS

(D.O.T. 045.108, 090.118 and .168, 129.108, and 166.168)

Nature of the Work

A student's choice of a particular institution of higher education is influenced by many factors. Availability of a specific educational program, quality of the school, cost, and location all may play important roles.

For many students, however, an equally important factor is the institution's ability to provide for their housing, social, cultural, and recreational needs. Developing and administering these services are the tasks of college student personnel workers. The admissions officer, the registrar, the dean of students, and the career planning and placement counselor are probably the best known among these. Other workers that make up this broad occupational field include student activities and college union personnel, student housing officers, counselors in the college counseling center, financial aid officers, and foreign student advisers.

Titles of student personnel workers vary from institution to institution and from program to program within a single school. Titles also vary with the level of responsibility within a student personnel program. The more common titles include dean, director, officer, associate dean, assistant director, and counselor.

The *dean of students*, or the vice president for student affairs, heads the student personnel program at a school. Among his or her duties are evaluating the changing needs of the students and helping the president of the college develop institutional policies. For example, to meet the needs of an increasing number of older, part-time students, colleges and universities have been changing policies in areas such as student housing and student participation in decisions on graduation requirements and course offerings. In addition, the dean of students generally coordinates a staff of associate or assistant deans who are in charge of the specific programs that deal directly with the students.

At some schools, the admissions office and the records office are separate. *Admissions counselors* interview and evaluate prospective students and process their applications. They may travel extensively to recruit high school, junior college, and older students and to acquaint them with opportunities available at their college. They work closely with faculty, administrators, financial aid personnel, and public relations staff to determine policies for recruiting and admitting students. Personnel in the office of the *registrar* maintain the academic records of students and provide current enrollment statistics to those who require them both within the college and in the community.

Student financial aid personnel help students obtain financial support for their education. Workers in this field must keep well-informed about the sources and management of all forms of financial aid—scholarships, grants, loans, employment, fellowships, and teaching and research assistantships. They work closely with administrators and the admissions, counseling, business, and academic office staffs.

Career planning and placement counselors, sometimes called college placement officers, assist students in career selections and also may help them get part-time and summer jobs. On many campuses, they arrange for prospective employers to visit the school to discuss their personnel needs and to interview applicants. (For further information on this field, see statement on college career planning and placement counselors.)

The student personnel staff in charge of *student activities* work with members of proposed and established student organizations, especially with student government. They help the student groups to plan, implement, and evaluate their activities. Often, the student activities staff will assist in the orientation of new students.

College union staff members work with students to provide intellectual, cultural, and recreational programs. Many college union staff members direct the operation of the physical facilities and services of the building,

Student financial aid personnel help students obtain financial support for their education.

such as food and recreational services, building maintenance, fiscal planning, and conference facilities.

Student housing officers sometimes live in the dormitories and, in general, help the students to live together in harmony. They may serve as counselors to individual students with personal problems. Housing officers also may be involved in managing the fiscal, food service, and housekeeping operations of student residences.

Counselors help students with personal, educational, and vocational problems. Students may come to the counselors on their own or be referred by a faculty member, a residence hall counselor, or a friend. Counseling needs may arise from lack of self-confidence or motivation on the part of the student, failure in academic work, desire to leave college or transfer to another college, inability to get along with others, loneliness, drug abuse, or marriage problems. In addition, there is a growing trend for counselors to try to reach more students by establishing group sensitivity sessions and telephone "hotlines." Counselors often administer tests that indicate aptitudes and interests to students having trouble understanding themselves. Some also teach in the college or assist with admissions, orientation, and training of residence hall staff. (For further information on this field, see statement on psychologists.)

Foreign student advisers administer and coordinate many of the services that help to insure a successful academic and social experience for students from other countries. They usually assist with foreign student admissions, orientation, financial aid, housing, English as a foreign language, academic and personal counseling, student-community relationships, job placement, and alumni relations. In addition, they may be an adviser for international associations and nationality groups and for U.S. students interested in study, educational travel, work, or service projects abroad.

Places of Employment

An estimated 57,000 college student personnel workers were employed in 1976. Every college and university, whether a 2-year or a 4-year school, has a staff performing student personnel functions. They are not always organized as a unified program. Large colleges and universities generally have specialized staffs for each personnel function. In many small colleges a few persons may carry out the entire student personnel program.

Training, Other Qualifications, and Advancement

Because of the diversity in duties, the education and backgrounds of college student personnel workers vary considerably. Generally, however, a master's degree is preferred and a doctoral degree may be necessary for advancement to top-level positions. Schools often prefer persons with a bachelor's degree in a social science, such as economics or history, and a master's degree in student personnel work. In 1976, 120 colleges and universities offered graduate programs in this area.

Other specialized training may also be required for some student personnel occupations. A master's degree in clinical or counseling psychology usually is required for work as a college counselor. This degree also is helpful in other student personnel fields such as career planning and placement. Familiarity with data processing is an asset, especially for work in admissions, records, or financial aid. Social science and recreation degrees also are useful, as is work experience in business, government, or educational associations.

College student personnel workers must be interested in, and able to work with, people of all backgrounds and ages. They must have the patience to cope with conflicting viewpoints of students, faculty, and parents. People in this field often deal with the unexpected and the unusual; therefore emotional stability and the ability to function while under pressure are necessities.

Entry level positions usually are those of student activities advisers, admissions counselors, financial aid counselors, residence hall directors, and assistants to deans. Persons without graduate degrees may find advancement opportunities limited. A doctorate usually is necessary for the top student personnel positions.

Employment Outlook

The employment outlook for college student personnel workers is likely to be somewhat competitive through 1985. Tightening budgets in both public and private colleges and universities, are expected to limit growth in employment. Student personnel positions least likely to be affected if some reduction becomes necessary are those in admissions, financial aid, and records. Most openings will result from the need to replace personnel who transfer to other positions, retire, or leave the field for other reasons.

Any employment growth that does occur is expected to be in junior and community colleges. Enrollment at this level of education has been rising and many new schools have opened. If these recent trends continue, some additional student personnel workers will be needed in 2-year institutions.

Earnings and Working Conditions

Salaries vary greatly depending on geographic location and the size of the school. According to the limited data available, top administrators with at least 5 years of experience averaged between $28,000 and $30,000 a year in 1976. In the larger colleges and universities, salaries reached as high as $46,000.

College student personnel workers frequently work more than a 40-hour week; often irregular hours and overtime work are necessary. Employment in these occupations usually is on a 12-month basis. In many schools, they are entitled to retirement, group medical and life insurance, and sabbatical and other benefits.

Sources of Additional Information

A pamphlet, *Careers in Higher Education*, is available from:

The American Personnel and Guidance Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

COMMERCIAL ARTISTS

(D.O.T. 141.031 and .081, 970.281 and .381, and 979.381)

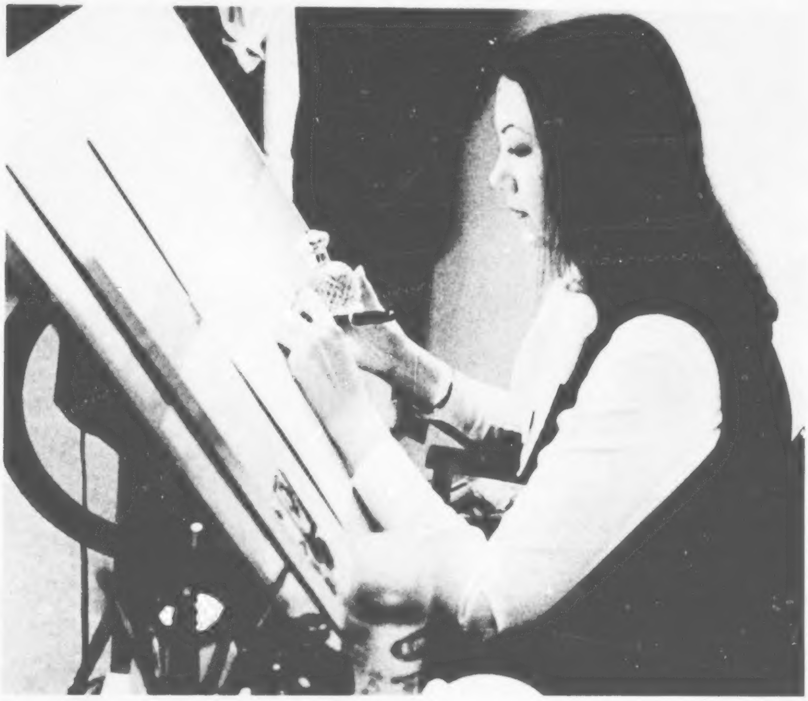
Nature of the Work

A team of commercial artists with varying skills and specializations often creates the artwork in newspapers and magazines and on billboards, brochures, and catalogs. This team is supervised by an art director, whose main function is to develop a theme or idea for an ad or an advertising campaign. After the art director has determined the main elements of an ad or design, he or she will turn it over to two specialists for further refinement. The *sketch artist*, also called a *renderer*, does a rough drawing of any pictures required. The *layout artist*, who is concerned with graphics rather than art work, constructs or arranges the illustrations or photographs, plans the typography and picks colors for the ad. What emerges is a "rough visual," a sketch of the finished ad. Both the sketch artist and the layout artist work closely with the art director; they may do several sketches or rough visuals before the director is satisfied.

Other commercial artists, usually with less experience, are needed to turn out the finished product. *Letterers* put together headlines and other words on the ad. They use set or photo lettering, and must have a knowledge of type faces and the ability to reproduce them in a variety of sizes and mediums such as ink, pencil, or cutout pieces of paper. *Mechanical artists* paste up an engraver's guide of the ad with all the elements in the exact size and place in which they will finally appear. Since this pasteup will be the engraver's blueprint, mechanical artists must be very precise.

Pasteup artists and other beginners do more routine work such as cutting mats, assembling booklets, or running errands.

In a small office, the art director may perform the layout and more routine work with the help of trainees. In a large office, however, the art director develops concepts with the copywriter; sets standards; deals with clients; and purchases needed photographs, illustrations, lettering, and other artwork from freelancers.



Some salaried commercial artists also do freelance work in their spare time.

Advertising agencies or advertising departments who lack time or personnel hire *freelance illustrators* to prepare sketches. These artists must be highly talented and able to work quickly—an agency, for example, may require a finished sketch in 1 day. Only the highly talented will receive enough assignments to maintain a sufficient income.

Advertising artists create the concept and artwork for a wide variety of items. These include direct mail advertising, catalogs, counter displays, slides, and filmstrips. They also design or lay out the editorial pages and features of newspapers and magazines and produce or purchase the necessary illustrations or artwork. Some commercial artists specialize in producing fashion illustrations, greeting cards, or book illustrations, or in making technical drawings for industry.

Places of Employment

About 67,000 persons worked as commercial artists in 1976. Although some commercial artists can be found in nearly every city, the majority work in large cities, such as New York, Los Angeles, Boston, Washington, D.C., and Chicago, where the largest users of commercial art are located.

Most commercial artists work as staff artists for advertising departments of large companies, advertising agencies, printing and publishing firms, textile companies, photographic studios, television and motion picture studios, department stores, and a variety of other business organizations. Many are self-employed or freelance artists. Some salaried commercial artists also do freelance work in their spare time. A few thousand commercial artists work for Federal Government agencies, principally in the Defense Department. A few teach in art schools.

Training, Other Qualifications, and Advancement

Artistic ability, imagination, neatness, and a capacity to visualize ideas on paper are important qualifications for success in commercial art. However, these qualities may be developed by specialized training in the techniques of commercial and applied art.

Persons can prepare for a career in commercial art by attending a 2- or 4-year trade school, or a junior college, college, or university which offers a program in commercial art. In 1976, about 900 institutions offered instruction in commercial art.

Most artists who enter the field are graduates of trade schools. Admission to these schools is based upon high school grades, a portfolio of art work, and an interview. A growing number of colleges and universities, however, confer degrees in commercial art. These college programs supplement art instruction with liberal arts courses such as English or history. Although many employers prefer graduates of a college or university program in commercial art, the quality and reputation of a particular program is more important than the type of institution offering it.

Limited training in commercial art also may be obtained through public vocational high schools and practical experience on the job. There is no formal training program for the commercial art trainee, however. Instead, trainees may run errands for the art director or do other general chores while learning. Additional training usually is needed for advancement. Beginners also should supplement their formal education and training by making posters, layouts, illustrations, and similar projects for schools and other organizations.

The first year in art school may be spent studying fundamentals—perspective, design, color harmony, composition—and the use of pencil, crayon, pen and ink, and other art media. Subsequent study, generally more specialized, includes drawing from life, advertising design, graphic design, lettering, typography, illustrations, and other courses in the student's particular field of interest.

In order to advance beyond a beginner's job, commercial artists must develop specialized skills. For example, letterers and retouchers must do precise and detailed work that requires excellent coordination. A sketch artist must be able to draw anything adequately in almost any medium, including die marker, pencil, ink or transparencies. Most commercial artists advance by specializing either in the mechanical elements of producing an ad (letterers and mechanical and layout artists) or in the pictorial elements (sketch artists and illustrators). Thus, a successful sketch artist may not be very skilled in typography. Art directors, however, need a strong educational background in art and business practices in addition to experience with photography, typography, and printing production methods. Advertising art directors require a special kind of creativity—the ability to conceive ideas that will stimulate the sale of the client's products or services.

Commercial artists usually assemble their best artwork into a "portfolio," to display their work. A good portfolio is essential for initial employment, for freelance assignments, and for job changes.

Employment Outlook

Talented and well-trained commercial artists may face competition for employment and advancement in most kinds of work through the mid-1980's. Those with only average ability and little specialized training are likely to encounter keen competition for beginning jobs and have very limited opportunities for advancement.

Employment of commercial artists is expected to increase about as fast as the average for all occupations through the mid-1980's. One anticipated area of growth is in visual advertising such as television graphics, packaging displays, and poster and window displays. The expanding field of industrial design also is expected to require more qualified artists for three-dimensional work with engineering concepts. (See statement on industrial designers.) In addition, a few thousand jobs for commercial artists are expected to open each year throughout the period to replace workers who will die, retire, or leave the field for other reasons.

The demand for commercial artists is expected to vary by specialization or type. For example, demand for freelance artists is expected to increase and experienced paste-up and mechanical artists are always needed; jobs for art directors and layout artists, however, will be fewer, much sought after, and open only to experienced, very talented, and creative artists. Employment opportunities are expected to be best for those who have a variety of skills rather than expertise in one or two specialties.

Commercial art occupations are particularly sensitive to changes in business conditions. Therefore, jobseekers may find that opportunities vary from year to year depending upon economic conditions.

Earnings and Working Conditions

In 1976, beginning commercial artists having no training beyond vocational high school typically earned from $90 to $110 a week; graduates of 2-year professional schools, $100 to $125 a week; and graduates of 4-year post-high school programs, $120 to $175 a week, according to the limited data available. Talented artists who had strong educational backgrounds and good portfolios, however, started at higher salaries. After a few years of experience, qualified illustrators may expect to earn $185 to $300 a week. Art directors, executives, well-known freelance illustrators, and others in top positions generally have much higher earnings, from $480 to $580 a week or more.

Earnings of freelance artists vary widely, since they are affected by factors such as skill level, variety, and popularity of work. Freelance artists may be paid by the hour or by the assignment. Commercial artists who worked for the Federal Government in 1977 had an average annual salary of $15,550 or about $300 a week.

Salaried commercial artists generally work 35 to 40 hours a week, but sometimes they must work additional hours under considerable pressure to meet deadlines. Freelance artists usually have irregular working hours.

Sources of Additional Information

Information on institutions offering programs in commercial art is available from:

National Art Education Association, National Education Association, 1916 Association Dr., Reston, Va. 22091.

COOPERATIVE EXTENSION SERVICE WORKERS

(D.O.T. 096.128)

Nature of the Work

Cooperative extension service workers, or extension agents as they are often called, conduct educational programs for rural residents in areas such as agriculture, home economics, youth activities, and community resource development. Extension agents generally specialize in one of these areas and have titles that match their specialties, such as extension agent for youth activities or extension agent for agriculture science and horticulture. They are employed jointly by State land-grant universities and the U.S. Department of Agriculture.

Extension agents usually work with groups of people. For example, the extension agent for youth activities conducts 4-H meetings for members in the area. During the summer, they may hold day camps to organize youth recreational activities. Agents who work in home economics set up meetings and programs to illustrate the benefits of proper nutrition and to educate homemakers in good nutrition.

Agriculture science extension agents conduct group meetings on topics of special interest to area farmers. In a county which has much dairy farming, extension agents arrange seminars covering dairy herd health or the raising of forage crops. During these seminars, agents instruct farmers in using the proper feeds to meet cows' nutritional needs and to raise their output of milk, and recognizing and combating health hazards including the possible establishment of a herd inspection program. They also may help local farmers market their products.

Extension agents for community resource development meet with community leaders to plan and provide for economic development of the community. They also assist community leaders in developing recreational programs and facilities and in planning other public projects, such as water supply and sewage systems, libraries and schools.

In addition to group work, they also do field work with individuals. If a farmer is having a problem with his or her crops, an extension agent will visit the farm, examine the problem and suggest remedies. Likewise, home economics extension agents occasionally visit homemakers to give personal help in solving problems.

An important part of each extension worker's job is to provide information that is important to people in

County extension worker gives technical advice to dairy farmer.

the community. Many extension agents write articles dealing with their areas of specialization for publication in local newspapers. Often these are regular feature columns that appear once a week. Others appear on local radio and television shows to give marketing reports for agricultural products important to the area, or present Saturday morning programs for young people. A few extension service workers produce documentary films on topics in which they have special training for broadcast on local television stations. Also, extension workers at some land grant universities produce and broadcast programs on university-owned UHF and cable television stations.

In addition to the extension service workers who work at the county level, State extension specialists, at land grant universities coordinate the efforts of county agents. State extension agents keep abreast of the latest research in their fields of study and develop ways of using the research in extension work at the county level. Some State extension workers may be on a split assignment and may teach classes at the university. Also, about 200 agricultural extension specialists are employed by the Extension Service of the U.S. Department of Agriculture in Washington, D.C.

Places of Employment

More than four-fifths of the approximately 16,000 cooperative extension service workers are employed by counties throughout the United States. Almost all of the more than 3,000 counties have county staffs. Depending on the population of the county, staffs range in size from one agent, who serves a wide variety of clientele interests, to a dozen or more agents, each serving a highly specialized need. Most of the remaining extension agents are employed by State extension services located on the campuses of land grant universities. A few work for regional staffs serving multicounty areas, and a small number are employed by the Extension Service of the U.S. Department of Agriculture. In addition, a few work in urban areas, mostly organizing 4-H activities for youth.

Training, Other Qualifications, and Advancement

Cooperative Extension Service agents are required to be proficient in disciplines related to the needs of their clientele. They must have a bachelor's degree in their subject-matter field. In addition, training in educational techniques and in a communications field such as journalism is extremely helpful.

Often, they receive specific instruction in extension work in a pre-induction training program, and can improve their skills through regular in-service training programs that cover both educational techniques and the subject matter for which they are responsible. Beside being proficient in their subject matter extension workers must like to work with people and to help them.

In most States, specialists and agents assigned to multicounty and State staff jobs are required to have at least one advanced degree and in many they must have a Ph. D.

Employment Outlook

The employment of cooperative extension service workers is expected to increase more slowly than the average for all occupation through the mid-1980's. As agricultural technology becomes more complicated, more extension workers trained in education and communications will be needed to disseminate information concerning advances in agricultural research and technology to the farm population. Also, modern farmers often are college educated and, thus, more likely to use innovative farming practices. This may increase the demand for extension agents since extension agents relay advances in farming practices from researchers to farmers.

Earnings and Working Conditions

The salaries of extension workers vary by locality, but, for the most part, they are competitive with salaries of other municipal and county professional employees, such as school teachers.

Extension agents work in offices and in the field. Since most extension service offices are located in small towns, persons who wish to live outside the city may find extension work the ideal career. Extension agents often get great satisfaction out of helping others.

Sources of Additional Information

Additional information is available from County Extension offices, the State Director of the Cooperative Extension Service located at each land-grant university, or the Extension Service, U.S. Department of Agriculture, Washington, D.C. 20250.

COUNSELORS

At some point in their lives, most people seek advice or assistance for personal, education, or vocational problems. These problems may be relatively minor, such as a conflict in a student's class schedule, or may involve serious emotional or physical disabilities. Regardless of the problem, counselors often are the ones to whom people turn for help.

Counselors may specialize in a specific area and work setting. Some deal primarily with school children, while others work only with adults. Some counselors are trained to assist in vocational planning and may work for State or private, nonprofit agencies. Whatever the area of specialization, counselors help people understand themselves—their capabilities and potential—so that they can make and carry out decisions and plans for a satisfying and productive life.

This chapter covers four counseling specialties: school; rehabilitation; employment; and college career planning and placement.

School counselors are the largest counseling group. They are primarily concerned with the personal, social, and educational development of students.

Rehabilitation counselors help persons with physical, mental, or social handicaps to become productive individuals.

Employment counselors counsel persons—the unemployed or unskilled, for example—who cannot find a job and/or have problems in career choice and planning.

College career planning and placement counselors help college students examine their own interests, abilities, and goals; explore career alternatives; and make and follow through with a career choice.

Persons who want to enter the counseling field must be interested in helping people and have an ability to understand their behavior. A pleasant but strong personality that instills confidence in clients is desirable. Counselors also must be patient, sensitive to the needs of others, and able to communicate orally as well as in writing.

ow not to blow a
interview

School counselors must keep up to date on opportunities for education and vocational training.

SCHOOL COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Uncertainty about career choice, learning disabilities, or an unhappy home life are typical problems that many students face. Usually these problems cannot be solved by the student alone; professional assistance often is needed. Most schools hire counselors to give individual attention to students' educational, career, and social development.

A counselor role is to help students understand themselves better—their abilities, talents, and career options, for example. To accomplish this, counselors may use tests and individual or group counseling; sometimes they develop specialized methods or seek the assistance of community resource persons.

When helping students in career choices, counselors often administer and evaluate tests. Some counselors also have responsibility for a career information center and the school's career education program. The counselor may, for example, suggest ways in which a math teacher can incorporate into a lesson information on occupations that require mathematics. Or the counselor may arrange field trips to factories and business firms or show films which provide a view of real work settings. The desired result is a student who is more aware of careers that match his or her talents, likes, and abilities and who can, with the assistance of the counselor, develop an educational and career plan.

School counselors must keep up-to-date on opportunities for educational and vocational training beyond high school to counsel students who want this information. They must keep informed about training programs in 2- and 4-year colleges; in trade, technical, and business schools; apprenticeship programs; and available federally supported programs. Counselors also advise students about educational requirements for entry level jobs, job changes caused by technological advances, college entrance requirements, and places of employment.

Counselors in junior high and high schools often help students find part-time jobs, either to enable them to stay in school or to help them prepare for their vocation. They may help both graduates and dropouts to find jobs or may direct them to community employment services. They also may conduct surveys to learn more about hiring experiences of recent graduates and dropouts, local job opportunities, or the effectiveness of the educational and guidance programs.

Counselors also work with problems affecting the school as a whole or one or two individuals. If drug abuse is a problem, counselors may, for example, initiate group counseling sessions to discuss the dangers of taking drugs. Or they may speak individually with students and their parents.

Counselors work closely with other staff members of the school, members of the community, and parents. Often, teachers and counselors confer about problems affecting a student or group of students. A teacher may refer a student who appears to have problems dealing with classmates to a counselor who will attempt to find the cause. Counselors may arrange meetings with parents or community agencies, such as mental health organizations, if a student's problems are serious.

Elementary school counselors help children to make the best use of their abilities by identifying these and other basic aspects of the child's makeup at an early age, and by evaluating any learning problems. Methods used in counseling grade school children differ in many ways from those used with older students. Observations of classroom and play activity furnish clues about children in the lower grades. To better understand children, elementary school counselors spend much time consulting with teachers and parents. They also work closely with other staff members of the school, including psychologists and social workers.

Some school counselors, particularly in secondary schools, teach classes in occupational information, social studies, or other subjects. They also may supervise school clubs or other extracurricular activities, often after regular school hours.

Places of Employment

About 43,000 people worked full time as public school counselors during 1976. Most counselors work in large schools. An increasing number of school districts, however, provide guidance services to their small schools by assigning more than one school to a counselor.

Training, Other Qualifications, and Advancement

Most States require school counselors to have counseling and teaching certificates. However, a growing number of States no longer require teacher certification. (See statements on elementary and secondary school teachers for certificate requirements.) Depending on the State, a master's degree in counseling and from 1 to 5 years of teaching experience usually are required for a counseling certificate. People who plan to become counselors should learn the requirements of the State in which they plan to work since requirements vary among States and change rapidly.

College students interested in becoming school counselors usually take the regular program of teacher education, with additional courses in psychology and sociology. In States where teaching experience is not a requirement, it is possible to major in a liberal arts program. A few States substitute a counseling internship for teaching experience. In some States teachers who have completed part of the courses required for the master's degree in counseling are eligible for provisional certification and may work as counselors under supervision while they take additional courses.

Counselor education programs at the graduate level are available in more than 450 colleges and universities, usually in the departments of education or psychology. One to 2 years of graduate study are necessary for a master's degree. Most programs provide supervised field experience.

Subject areas of required graduate level courses usually include appraisal of the individual student, individual counseling procedures, group guidance, information service for career development, professional relations and ethics, and statistics and research.

The ability to help young people accept responsibility for their own lives is important for school counselors. They must be able to coordinate the activity of others and work as part of the team which forms the educational system.

School counselors may advance by moving to a larger school; becoming director or supervisor of counseling or guidance; or, with further graduate education, becoming a college counselor, educational psychologist, school psychologist, or school administrator. Usually college counselors and educational psychologists must earn the Ph. D. degree.

Employment Outlook

Employment of school counselors is likely to grow more slowly than the average for all occupations through the mid-1980's as declining school enrollments coupled with financial constraints limit demand. If Federal assistance for career education is increased, however, many more jobs should result. Thus, future growth in counselor employment will depend largely on the amount of funds that the Federal Government provides to the States.

Earnings and Working Conditions

According to a recent survey, the average salary of school counselors ranged from $11,646 to $18,929. School counselors generally earn more than teachers at the same school. (See statements on kindergarten and elementary school teachers and secondary school teachers.)

In most school systems, counselors receive regular salary increments as they obtain additional education and experience. Some counselors supplement their income by part-time consulting or other work with private or public counseling centers, government agencies, or private industry.

Sources of Additional Information

State departments of education can supply information on colleges and universities that offer training in guidance and counseling as well as on the State certification requirements.

Additional information on this field of work is available from:

American School Counselor Association,
1607 New Hampshire Ave. NW., Washington, D.C. 20009.

EMPLOYMENT COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Uncertainty about career plans is a problem faced not only by youngsters in school but also by many adults. Many persons lack realistic career goals, adequate job training, or knowledge about the labor market. Some become unemployed. Veterans and school dropouts are examples of other individuals who often do not know how to turn their talents and abilities into marketable skills. Employment counselors (sometimes called vocational counselors) help these and other jobseekers.

Most employment counselors assist persons who turn to State or community agencies for advice. The handicapped, older workers, and individuals displaced by automation and industry shifts or unhappy with their present occupational fields are typical applicants. Some jobseekers are skilled in specific occupations and ready for immediate job placement; others, who have little education and lack marketable skills, need intensive training to prepare for jobs. In State employment services, the counselor also helps those who are least employable, such as welfare recipients, ex-prisoners, and the educationally and culturally deprived.

Counselors interview jobseekers to learn employment-related facts about their interests, training, work experience, work attitudes, physical capacities, and personal traits. If necessary, they may get additional data by arranging for aptitude and achievement tests and interest inventories, so that more objective advice may be given. They also may get additional information by speaking with the applicant's former employer or school principal.

When a jobseeker's background—the person's abilities and limitations has been thoroughly reviewed, the employment counselor discusses occupational requirements and job opportunities in different fields within the potential of the jobseeker. Then the counselor and the client develop a vocational plan. This plan may specify a series of steps involving remedial education, job training, work experience, or other services needed to enhance the person's employability.

In many cases, employment counselors refer jobseekers to other agencies for physical rehabilitation or psychological or other services before or during counseling. If, for example, a person is hampered in a job search because of stuttering, the counselor might suggest visits with city or county medical personnel. Proper referrel requires that counselors be familiar with the available community services so that they can select those most likely to benefit a particular jobseeker.

Counselors may help jobseekers by suggesting employment sources and appropriate ways of applying for work. In some cases, counselors may contact employers about jobs for applicants, although in State employment services agencies, placement specialists often handle this work. After job placement or entrance into training, counselors may follow up to determine if additional assistance is needed.

The expanding responsibility of public employment service counselors for improving the employability of disadvantaged persons has increased their contacts with these persons during training and on the job. Also, it has led to group counseling and the stationing of counselors in neighborhood and community centers.

Places of Employment

In 1976, about 3,400 persons worked as employment counselors in State employment service offices, located in every large city and many smaller towns. In addition, about 3,000 employment counselors worked for various private or community agencies, primarily in the larger cities. Some worked in institutions such as prisons, training schools for delinquent youths, and mental hospitals. Also, the Federal Government employed a limited number of employment counselors, chiefly in the Veterans Administration and in the Bureau of Indian Affairs. Some counselors teach in graduate training programs or conduct research.

Training, Other Qualifications, and Advancement

The national qualification standard for first level employment counselors in State employment service offices calls for 30 graduate semester hours of counseling courses beyond a bachelor's degree. However, 1 year of counseling-related experience may be substituted for 15 graduate semester hours.

All States require counselors in their public employment offices to meet State civil service or merit system requirements that include minimum educational and experience standards.

Applicants with advanced degrees and additional qualifying experience may enter at higher levels on the counselor career ladder. Many States also make provision for individuals with extensive experience in the employment service, whether or not they have college degrees, to enter the counselor career ladder and move upward by acquiring the prescribed university coursework and qualifying experience for each level.

Although minimum entrance requirements are not standardized among private and community agencies, most prefer, and some require, a master's degree in vocational counseling or in a related field such as psychology, personnel administration, counseling, guidance education, or public administration. Many private agencies prefer to have at least one staff member who has a doctorate in counseling psychology or a related field. For those lacking an advanced degree, employers usually emphasize experience in closely related work such as rehabilitation counseling, employment interviewing, school or college counseling, teachi[illegible]cial work, or psychology.

In e[illegible]tate, the public employment s[illegible]ce offices provide some in-service training programs for their new counselors or trainees. In addition, both their new and experienced counselors often are given part-time training at colleges and universities during the regular academic year or at institutes or summer sessions. Private and community agencies also often provide in-service training opportunities.

College students who wish to become employment counselors should enroll in courses in psychology and basic sociology. At the graduate level, requirements for this field usually include courses in techniques of counseling, psychological principles and psychology of careers, assessment and appraisal, cultures and environment, and occupational information. Counselor education programs at the graduate level are available in more than 450 colleges and universities, mainly in departments of education or psychology. To obtain a master's degree, students must complete 1 to 2 years of graduate study including actual experience in counseling under the supervision of an instructor.

Persons aspiring to be employment counselors should have a strong interest in helping others make vocational plans and carry them out. They should be able to work independently and to keep detailed records.

Well-qualified counselors with experience may advance to supervisory or administrative positions in their own or other organizations. Some may become directors of agencies or of other counseling services, or area supervisors of guidance programs; some may become consultants; and others may become professors in the counseling field.

Employment Outlook

Employment counselors with master's degrees or experience in related fields are expected to face some competition in both public and community employment agencies through the mid-1980's. Actual growth in employment of counselors will depend in large part on the level of Federal funding to State, local and community agencies to provide counseling services. Some openings for employment counselors will result, however, from the need to replace those who die, retire, or transfer to other occupations.

Earnings and Working Conditions

Salaries of employment counselors in State employment services vary considerably from State to State. In 1976, salaries ranged from about $7,000 for entry level positions to $21,000 for experienced counselors. The average starting salary for beginning workers was $10,506, while experienced counselors averaged $13,814.

According to the limited data available, the average starting salary for counselors in private, nonprofit organizations in 1976 was $8,500. The average for experienced workers was $16,000. In general, salaries of employment counselors are about 1 1/2 times as high as average earnings for all nonsupervisory workers in private industry, except farming.

Most counselors work about 40 hours a week and have various benefits, including vacations, sick leave, pension plans, and insurance coverage. Counselors employed in community agencies may work overtime.

Sources of Additional Information

For general information on employment or vocational counseling, contact:

National Employment Counselors Association, 1607 New Hampshire Ave., NW Washington, D.C. 20009.

National Vocational Guidance Association, 1607 New Hampshire Ave. NW., Washington D.C. 20009.

U.S. Department of Labor, Employment and Training Administration, USES, Division of Counseling and Testing, Washington, D.C. 20210.

The administrative office for each State's employment security agency, bureau, division, or commission can supply specific information about local job opportunities, salaries, and entrance requirements for positions in public employment service offices.

REHABILITATION COUNSELORS

(D.O.T. 045.108)

Nature of the Work

Each year more mentally, physically, and emotionally disabled persons become self-sufficient and productive citizens. They find employment in a wide variety of occupations previously thought too complex or dangerous for them to handle. A growing number are studying in colleges and technical schools throughout the United States. One member of the team of professionals who help disabled individuals leave a sheltered environment to lead as normal a life as possible is the rehabilitation counselor.

Rehabilitation counselors begin their work by learning about their client. They may read school reports, confer with medical personnel, and talk with family members to determine the exact nature of the disability. They also discuss with physicians, psychologists, and occupational therapists the types of skills the client can learn. At that point, the counselor begins a series of discussions with the client to explore training and career options. The counselor then uses this information to develop a rehabilitation plan.

A rehabilitation program generally includes specific job training, such as secretarial studies, as well as other specialized training the disabled person may need. When working with a blind individual, for example, the counselor may arrange for training with seeing-eye dogs. The disabled person then may spend a few months learning to cross streets and ride public transportation systems. Throughout this period, the counselor and disabled client meet reguarly to discuss progress in the rehabilitation program and any problems that may arise.

Counselors also must find jobs for disabled persons and often make follow-up checks to insure that placement has been successful. If the new employee has a specific problem on the job, the counselor may suggest adaptations to the employer.

Rehabilitation counselors must maintain close contact with handicapped clients and their families over many months or even years. The counselor often has the satisfaction of watching day-by-day progress in the disabled person's fight for independence. At other times, however, the counselor may experience the disappointment of a client's failures.

Because job placement is an important aspect of a counselor's work, he or she must keep in touch with members of the business community to learn the type of jobs available and training required. They also try to alleviate any fears on the part of em-

Rehabilitation counselor assisting blind person in use of tape recorder.

ployers about the suitability of hiring handicapped individuals. As a result, counselors may spend time publicizing the rehabilitation program to business and community associations.

An increasing number of counselors specialize in a particular area of rehabilitation; some may work almost exclusively with blind people, alcoholics or drug addicts, the mentally ill, or retarded persons. Others may work almost entirely with persons living in poverty areas.

The amount of time spent counseling each client varies with the severity of the disabled person's problems as well as with the size of the counselor's caseload. Usually, counselors in private organizations can spend more time with clients than their counterparts in State agencies. Some rehabilitation counselors are responsible for many persons in various stages of rehabilitation; on the other hand, less experienced counselors or those working with the severely disabled may work with relatively few cases at a time.

Places of Employment

About 19,000 persons worked as rehabilitation counselors in 1976. About 70 percent worked in State and local rehabilitation agencies financed cooperatively with Federal and State funds. Some rehabilitation counselors and counseling psychologists worked for the Veterans Administration. Rehabilitation centers, sheltered workshops, hospitals, labor unions, insurance companies, special schools, and other public and private agenices with rehabilitation programs and job placement services for the disabled employ the rest.

Training, Other Qualifications, and Advancement

A bachelor's degree with courses in counseling, psychology, and related fields is the minimum educational requirement for rehabilitation counselors. However, employers are placing increasing emphasis on the master's degree in rehabilitation counseling or vocational counseling, or in related subjects such as psychology, education, and social work. Work experience in fields such as vocational counseling and placement, psychology, education, and social work is an asset for securing employment as a rehabilitation counselor. Most agencies have work-study programs whereby employed counselors can earn graduate degrees in the field.

More than 75 college and universities offered graduate programs in rehabilitation counseling in 1976. Usually, 1 1/2 to 2 years of study are required for the master's degree. Included is a period of actual work experience as a rehabilitation counselor under the close supervision of an instructor. Besides a basic foundation in psychology, courses generally included in master's degree programs are counseling theory and techniques, occupational and educational information, and community resources. Other requirements may include courses in placement and followup, tests and measurements, psychosocial effects of disability, and medical and legislative aspects of rehabilitation.

To earn the doctorate in rehabilitation counseling or in counseling psychology may take a total of 4 to 6 years of graduate study. Intensive training in psychology and other social sciences, as well as in research methods, is required.

Many States require that rehabilitation counselors be hired in accordance with State civil service and merit system rules. In most cases, these regulations require applicants to pass a competitive written test, sometimes supplemented by an interview and evaluation by a board of examiners. In addition, some private organizations require rehabilitation counselors to be certified. To become certified, counselors must pass exams administered by the Commission on Rehabilitation Counselor Certification.

Because rehabilitation counselors deal with the welfare of individuals, the ability to accept responsibility is important. It also is essential that they be able to work independently and be able to motivate and guide the activity of others. Counselors who work with the severely disabled need unusual emotional stability. They must be very patient in dealing with clients who often are discouraged, angry, or otherwise difficult to handle.

Counselors who have limited experience usually are assigned the less difficult cases. As they gain experience, their caseloads are increased and they are assigned clients with more complex rehabilitation problems. After obtaining considerable experience and more graduate education, rehabilitation counselors may advance to supervisory positions or top administrative jobs.

Employment Outlook

Because most State and private rehabilitation agencies are funded primarily by the Federal Government, the extent of employment growth will depend largely on the level of government spending. Additional positions, however, are expected to become available in private companies, such as manufacturing and service firms, for rehabilitation counselors to help in equal employment opportunity efforts. In addition to growth needs, many counselors will be required annually to replace those who die, retire, or leave the field for other reasons.

Earnings and Working Conditions

Salaries of beginning rehabilitation counselors in State agencies averaged $10,441 a year in 1976. Beginning salaries ranged from $7,200 in Puerto Rico to $15,774 in Alaska.

The Veterans Administration paid counseling psychologists with a 2-year master's degree and 1 year of subsequent experience—and those with a Ph. D.—starting salaries of $17,056 in 1976. Those with a Ph. D. and a year of experience, and those with a 2-year master's degree and much experience, started at $20,442. Some rehabilitation counselors with a bachelor's degree were hired at starting salaries of $11,523 and $14,097. In general, salaries of rehabilitation counselors are above the average earnings for all nonsupervisory workers in private industry, except farming.

Counselors may spend only part of their time in their offices counseling and performing necessary paperwork. The remainder of their time is spent away from the office, working with prospective employers, training agencies, and the disabled person's family. The ability to drive a car often is necessary for this work.

Rehabilitation counselors generally work a 40-hour week or less, with some overtime work required to attend community and civic meetings in the evening. They usually are covered by sick and annual leave benefits and pension and health plans.

Sources of Additional Information

For information about rehabilitation counseling as a career, contact:

American Psychological Association, Inc., 1200 17th St. NW., Washington, D.C. 20036.

American Rehabilitation Counseling Association, 1607 New Hampshire Ave. NW., Washington, D.C. 20009.

National Rehabilitation Counseling Association, 1522 K St. NW., Washington, D.C. 20005.

Information on certification requirements and procedures is available from:

Commission on Rehabilitation Counselor Certification, 520 North Michigan Ave., Chicago, Ill. 60611.

COLLEGE CAREER PLANNING AND PLACEMENT COUNSELORS

(D.O.T. 166.268)

Nature of the Work

Choosing a career is a decision faced by many college students. Finding an occupation that matches one's likes, dislikes, and talents can be difficult and time consuming. And, once the decision is made, there is still the problem of writing resumes, being interviewed, and searching out prospective employers—often an anxiety-producing and discouraging experience.

Career planning and placement counselors help bridge the gap between education and work by assisting students in all phases of career decisionmaking and planning. These counselors, sometimes called college placement officers, provide a variety of services to college students and alumni. They assist students in making career selections by encouraging them to examine their interests, abilities, and goals, and then helping them to explore possible career alternatives. They may, for example, arrange part-time or summer employment with a local government agency for an architectural student considering a career as a city planner. Or they may discuss employment options and training requirements with students majoring in history. Ofen, counselors suggest additional courses or further training to enchance employment prospects.

Career planning and placement counselors also arrange for job recruiters to visit the campus to discuss their firm's personnel needs and to interview applicants. They provide employers with information about students and inform students about business operations and personnel needs in industry. A counselor may, for example, explain to students that workers in certain industries are subject to layoffs. In order to counsel students adequately, counselors must keep abreast of job market developments by reading literature in the field and maintaining contact with industry and government personnel recruiters.

Some career planning and placement counselors, especially those in junior or community colleges, advise administrators on curriculum and course content. They may suggest courses that employers believe would train students more adequately. In addition, some counselors, especially those working in small schools, also teach. All counselors maintain a library of career guidance and recruitment information.

Counselor discusses career alternatives with college student.

Placement counselors may specialize in areas such as law, education, or part-time and summer work. However, the extent of specialization usually depends upon the size and type of college as well as the size of the placement staff.

Places of Employment

Nearly all 4-year colleges and universities and many of the increasing number of junior colleges provide career planning and placement services to their students and alumni. Large colleges may employ several counselors working under a director of career planning and placement activities; in many institutions, however, a combination of placement functions is performed by one director aided by a clerical staff. In some colleges, especially the smaller ones, the functions of career counselors may be performed on a part-time basis by members of the faculty or administrative staff. Universities frequently have placement officers for each major branch or campus.

About 3,900 persons worked as career planning and placement counselors in colleges and universities in 1976. Nearly three-fourths worked in 4-year institutions. The remainer worked in junior and community colleges.

Training, Other Qualifications, and Advancement

Although no specific educational program exists to prepare persons for career planning and placement work, a bachelor's degree, preferably in a behavioral science, such as psychology or sociology, is customary for entry into the field, and a master's degree is increasingly being stressed.

In 1976, 120 colleges and universities offered graduate programs in college student personnel work. Graduate courses that are helpful for career planning and placement counseling include counseling theory and techniques, vocational testing, theory of group dynamics, and occupational research and employment trends.

Some people enter the career planning and placement field after gaining a broad background of experience in business, industry, government, or educational organizations. An internship in a career planning and placement office also is helpful.

College career planning and placement counselors must have an interest in people. They must be able to communicate with and gain the confidence of students, faculty, and employers in order to develop insight into the employment needs of both employers and students. People in this field should be energetic and able to work under pressure because they must organize and administer a wide variety of activities.

Advancement for career planning and placement professionals usually is through promotion to an assistant or associate position, director of career planning and placement, director of student personnel services, or some other higher level administrative position. However, the extent of such opportunity usually depends upon the type of college or university and the size of the staff.

Employment Outlook

Employment of college career planning and placement counselors is expected to increase through the mid-1980's. Demand will be greatest in junior and community colleges, where, in many cases, there are no career planning and placement programs at present. In addition, the large number of adults entering community colleges who have been out of the labor market or who are seeking a mid-career change will require specialized counseling.

Also contributing to the demand in all postsecondary institutions will be the expected continued expansion in services to students from minority and low-income groups, who require special counseling in choosing careers and assistance in finding part-time jobs. Growth also is expected in services to the handicapped and to adults participating in continuing education.

However, many institutions of higher education faced financial problems in 1976. If this situation persists, colleges and universities may be forced to limit expansion of counseling and placement services, resulting in competition for available positions.

Earnings and Working Conditions

Salaries vary greatly among educational institutions. According to the limited information available, the average salary of college career planning and placement directors was more than $17,000 a year in 1976.

Career planning and placement counselors frequently work more than a 40-hour week; irregular hours and overtime often are necessary, particularly during the "recruiting season." Most counselors are employed on a 12-month basis. They are paid for holidays and vacations and usually receive the same benefits as other professional personnel employed by colleges and universities.

Sources of Additional Information

A booklet on the college student personnel professions, as well as other information on career counseling and placement, is available from:

The College Placement Council, Inc., P.O.
Box 2263, Bethlehem, Pa. 18001.

CREDIT MANAGERS

(D.O.T. 168.168)

Nature of the Work

Both businesses and individuals may require credit (the postponement of payment until a future date) to meet their daily needs for a variety of goods and services. For most forms of credit, a credit manager has final authority to accept or reject a credit application.

In extending credit to a business (commercial credit), the credit manager, or an assistant, analyzes detailed financial reports submitted by the applicant, interviews a representative of the company about its management, and reviews credit agency reports to determine the firm's record in repaying debts. The manager also checks at banks where the company has deposits or previously was granted credit. In extending credit to individuals (consumer credit), detailed financial reports usually are not available. The credit manager must rely more on personal interviews, credit bureaus, and banks to provide information about the person applying for credit.

Particularly in large organizations, executive level credit managers are responsible for formulating a credit policy. They must establish financial standards to be met by applicants and thereby determine the amount of risk that their company will accept when offering its products or services for sale on credit. Managers usually cooperate with the sales department in developing a credit policy liberal enough to allow the company's sales to increase and yet strict enough to deny credit to customers whose ability to repay their debts is questionable. Many credit managers establish office procedures and supervise workers who gather information, analyze facts, and perform general office duties in a credit department; they include application clerks, collection workers, bookkeepers, and secretaries.

In smaller companies that handle a limited number of accounts, credit managers may do much of the work of granting credit themselves. They may interview applicants, analyze the information gained in the interview, and make the final approval. They frequently must contact customers who are unable or refuse to pay their debts. They do this through writing, telephoning, or personal contact. If these attempts at collection fail, credit managers may refer the account to a collection agency or assign an attorney to take legal action.

Places of Employment

About 53,000 persons worked as credit managers in 1976. About one-half were employed in wholesale and retail trade, but many others, about one-third of the total, worked for manufacturing firms and financial institutions.

Although credit is granted throughout the United States, most credit managers work in urban areas where many financial and business establishments are located.

Training, Other Qualifications, and Advancement

A college degree is becoming increasingly important for entry level jobs in credit management. Employers usually seek persons who have majored in business administration, economics, or accounting, but may also hire graduates holding liberal arts degrees. Some employers promote high school graduates to credit manager positions if they have experience in credit collection or processing credit information.

Newly hired workers normally begin as management trainees and work under the guidance of more experienced personnel in the credit department. Here they gain a thorough understanding of the company's

A college degree is becoming increasingly important for entry level jobs in credit management.

credit procedures and policies. They may analyze previous credit transactions to learn how to recognize which applicants should prove to be good customers. Trainees also learn to deal with credit bureaus, banks, and other businesses that can provide information on the past credit dealings of their customers.

Many formal training programs are available through the educational branches of the associations that serve the credit and finance field. This training includes home study, college and university programs, and special instruction to improve beginners' skills and keep experienced credit managers aware of new developments in their field.

A person interested in a career as a credit manager should be able to analyze detailed information and draw valid conclusions based on this analysis. Because it is necessary to maintain good customer relationships, a pleasant personality and the ability to speak and write effectively also are characteristics of the successful credit manager.

The work performed by credit managers allows them to become familiar with almost every phase of their company's business. Highly qualified and experienced managers can advance to top-level executive positions. However, in small and medium-sized companies, such opportunities are limited.

Employment Outlook

Through the mid-1980's employment is expected to grow more slowly than the average for all occupations. Despite this relatively slow growth, many jobs will become available each year due to the need to replace persons who leave the occupation. Although there will be opportunities throughout the country, employment prospects should continue to be best for well-qualified jobseekers in metropolitan areas.

The volume of credit extended rose very rapidly during the past decade. In the years ahead, businesses can be expected to require increasing amounts of credit to secure raw materials for production and obtain finished goods for eventual resale. It is in the area of business credit where demand for credit managers will be strongest.

Consumers, whose personal incomes have risen, are expected to finance greater numbers of high-priced items. In addition, the use of credit for everyday purchases is expected to grow as demand increases for recreation and household goods as well as for consumer services. Despite increases in consumer debt, the use of computers for storing and retrieving information will enable this greater volume of information to be processed more efficiently. The use of telecommunications networks enables retail outlets to have immediate access to a central credit office, regardless of distance.

Another factor that is expected to slow the growth in the number of credit managers is the increased use of bank credit cards. As stores substitute bank credit cards for their own charge accounts, credit departments may be reduced or eliminated.

Earnings and Working Conditions

In 1976, credit manager trainees who had a college degree earned annual salaries that ranged from about $10,000 to $11,000, depending on the type of employer and the geographic location of the job.

Assistant credit managers averaged about $12,000 to $14,000 a year and credit managers had average earnings of about $17,000. Individuals in top-level positions often earn over $40,000 a year.

Credit managers normally work the standard workweek of their company—35-40 hours, but some work longer hours. In wholesale and retail trade, for example, a seasonal increase in credit sales can produce a greater work volume. Some credit managers attend conferences sponsored by industry and professional organizations where managers meet to develop and discuss new techniques for the management of a credit department.

Sources of Additional Information

Information about a career in consumer credit may be obtained from:

International Consumer Credit Association,
375 Jackson Ave., St. Louis, Mo. 63130.

National Consumer Finance Association,
1000 16th St., NW., Washington, D.C.
20036.

For information about training programs available in commercial credit, write:

National Association of Credit Management,
475 Park Ave. South, New York, N.Y.
10016.

DANCERS

(D.O.T. 151.028 and 151.048)

Nature of the Work

Dancing is an ancient and worldwide art that has many different forms. Dance movements may be used to interpret an idea or a story, or they may be purely physical expressions of rhythm and sound. Professional dancers may perform in classical ballet or modern dance, in dance adaptations for musical shows, in folk dances, and in other popular kinds of dancing. In addition to being an important art form for its own sake, dance also is used to supplement other types of entertainment, such as opera, musical comedy, and television.

In dance productions, performers most often work as a group. However, a very few top artists do solo work.

Many dancers combine stage work with full-time teaching. A few dancers become choreographers and create new routines. Others are dance directors who train dancers in new productions.

(This statement does not include instructors of ballroom, American or international folk dance, or other social dancing.)

Places of Employment

About 8,000 dancers performed on the stage, screen, and television in 1976. Many others taught in secondary schools, in colleges and universities, in dance schools, and in private studios. A few teachers, trained in dance therapy, worked in mental hospitals.

Dance teachers are located chiefly in large cities, but many smaller cities and towns have dance schools as well. New York City is the hub for performing dancers. Other large cities that have promising employment opportunities, including major dance companies, include Los Angeles, Chicago, Houston, Salt Lake City, Cincinnati, Miami, San Francisco, Los Angeles, Minneapolis, Seattle, Boston, and Philadelphia.

Training and Other Qualifications

Serious training for a career in dancing traditionally begins by age 12 or earlier. Ballet training is particularly disciplined, and persons who wish to become ballet dancers should begin taking lessons at the age of 7 or 8. Early and intense training also is important for the modern dancer. Most dancers have their professional auditions by age 17 or 18, but training and practice never end. For example, professional ballet dancers take from 10 to 12 lessons a week for 11 or 12 months of the year, and must spend many additional hours practicing.

The early training a dancer receives is crucial to the later skill of the dancer, and therefore the selection of a professional dance school is very important.

Because of the strenuous training required, a dancer's general education may be minimal. However, a dancer should study music, literature, and history along with the arts to help in the interpretation of dramatic episodes, ideas, and feelings.

Over 115 colleges and universities confer bachelor's or higher degrees in dance. College or university dance degrees are generally offered through the departments of physical education, music, theater, or fine arts.

A college education is not essential to obtaining employment as a professional dancer. In fact, ballet dancers who postpone their first audition until graduation may compete at a disadvantage with younger dancers.

Although a college education is an advantage in obtaining employment as a dance teacher in a college or university, it is of little use for one who teaches professional dance or choreography in a studio situation. Professional schools usually require teachers to have experience as a performer; colleges and conservatories generally require graduate degrees, but experience as a performer often may be substituted. Maturity and a broad educational background also are important.

The dancer's life is one of rigorous practice and self-discipline.

The dancer's life is one of rigorous practice and self-discipline; therefore patience, perseverence, and a devotion to dance are essential. Good health and physical stamina are necessary, both to keep in good condition and to follow the rugged travel schedule which is often required.

Body height and build should not vary much from the average. Good feet and normal arches also are required. Above all, one must have agility, grace, and a feeling for music, as well as a creative ability to express oneself through dance.

Seldom does a dancer perform unaccompanied. Therefore, young persons who consider dancing as a career should be able to function as part of a team. They also should be prepared to face the anxiety of unstable working conditions brought on by show closings and audition failures.

Because of the strenous nature of the art, young dancers have an advantage over older dancers in competing for jobs. Many dancers retire in their thirties or transfer to related fields such as teaching dance. However, some skillful dancers continue performing beyond the age of 50. Those who become choreographers or dance directors can continue to work as long as persons in other occupations.

Employment Outlook

Employment of dancers is expected to grow about as fast as the average for all occupations. However, the number of dancers seeking professional careers will continue to exceed the number of available positions, and competition will be keen. Most employment opportunities will result from replacement needs.

Employment opportunities in stage productions are limited, and competition for such positions is great. Television is partly responsible for the reduction in stage productions, yet at the same time this media offers new outlets for dance. New professional dance companies formed from the increasing number of civic and community groups offer additional employment opportunities. As a result of the increased general popularity of dance in recent years, the best employment opportunities are in teaching dance.

Earnings and Working Conditions

Professional dancers who perform usually are members of one of the unions affiliated with the Associated Actors and Artistes of America (AFL-CIO). Dancers in opera ballet, classical ballet, and the modern dance belong to the American Guild of Musical Artists, Inc.; those on live or videotaped television belong to the American Federation of Television and Radio Artists; those who perform in films and TV belong to the Screen Actors Guild or the Screen Extras Guild; and those in musical comedies join Actors' Equity Association. Other dancers may be members of other unions, depending upon the fields in which they perform. The unions and producers sign basic agreements specifying minimum salary rates, hours of work, and other conditions of employment. However, the separate contract signed by each dancer with the producer of the show may be more favorable than the basic agreement regarding salary, hours of work, and working conditions.

In 1976, the minimum salary for dancers in opera and other stage productions was about $250 a week. The single performance rate for ballet dancers was about $100 for a solo dance and about $50 per dancer for a group. Dancers on tour received an allowance of $30 a day in 1976 for room and board, with the employer paying the cost of transportation. For a brief appearance in a performance on television or a few days' work in a movie, the minimum rate was higher, relative to time worked. However, this difference was offset by the brevity of the engagement and the long period likely waiting for the next one.

Unemployment rates for dancers are higher than the average for all occupations. Many qualified people cannot obtain year-round work as dancers, and are forced to supplement their incomes by other types of work. Some dancers who are qualified to teach combine teaching with performing.

Salaries of dance teachers vary with the location and the prestige of the school in which they teach. Dance instructors in colleges and universities are paid on the same basis as other faculty members. (See statement on college and university teachers.)

The normal workweek is 30 hours (6 hours per day maximum) spent in rehearsals and matinee and evening performances. Extra compensation is paid for additional hours worked. Most stage performances take place, of course, in the evening, and rehearsals require very long hours, often on weekends and holidays. For shows on the road, weekend travel often is required.

Dancers are entitled to some paid sick leave and various health and welfare benefits provided by their unions, to which the employers contribute. Dance instructors in schools receive benefits comparable to those of other teachers.

Sources Of Additional Information

Information on colleges and universities that give a major in the dance or some courses in the dance, as well as details on the types of courses and other pertinent information is available from:

National Dance Association, a division of the American Alliance for Health, Physical Education and Recreation, 1201 16th St. NW., Washington, D.C. 20036.

For information on all aspects of dance, counseling services, and job listings, contact:

American Dance Guild, 1619 Broadway, Room 603, New York, N.Y. 10019.

DENTAL HYGIENISTS

(D.O.T. 078.368)

Nature of the Work

Dental hygienists are oral health clinicians and educators who help the public develop and maintain good oral health. As members of the dental health team, dental hygienists may perform preventive and therapeutic services under the supervision of the dentist. Specific responsibilities of the hygienist vary, depending on the law of the State where the hygienist is employed, but may include: removing deposits and stains from patients' teeth; providing instructions for patient self-care, and dietetic and nutritional counseling; and the application of medicine for the prevention of tooth decay. They take medical and dental histories, expose and develop dental X-ray films, make model impressions of teeth for study, and prepare other diagnostic aids for use by the dentist. Pain control and restorative procedures also may be performed by dental hygienists in some States.

Dental hygienists who work in school systems serve in several capacities. Clinical functions include: examination of children's teeth, assistance to the dentist in determining the dental treatment needed, and reporting of their findings to parents. They also scale and polish teeth and give instruction on proper mouth care. In addition, they develop classroom or assembly programs on oral health.

A few dental hygienists assist in research projects. Those having advanced training may teach in schools of dental hygiene.

Places of Employment

Nearly 27,000 persons worked as dental hygienists in 1976. Many are employed part time. Most work in private dental offices. Public health agencies, school systems, industrial plants, clinics, hospitals, dental hygiene schools, and the Federal Government are other sources of employment for dental hygienists. Some who are graduates of bachelor's degree programs are commissioned officers in the Armed Forces.

Dental hygienists must be licensed.

Training and Other Qualifications

Dental hygienists must be licensed. To obtain a license in most States, a candidate must be a graduate of an accredited dental hygiene school and pass both a written and clinical examination. For the clinical examination, the applicant is required to perform dental hygiene procedures, such as removing deposits and stains from a patient's teeth. In 1976, candidates in 48 States and the District of Columbia could complete part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners. Few States permit dental hygienists licensed in other States to practice in their jurisdictions without further examination.

In 1976, 182 schools of dental hygiene in the United States were accredited by the American Dental Association. Most programs grant an associate degree; others lead to a bachelor's degree. Some institutions offer both types of programs. Eighteen schools offer master's degree programs in dental hygiene or related fields.

Completion of an associate degree program usually is sufficient for the dental hygienist who wants to practice in a private dental office. In order to do research, teach, and work in public or school health programs, at least a baccalaureate degree usually is required. Dental hygienists with a master's degree work as teachers or administrators in dental hygiene and dental assisting training programs, public health agencies, and in associated research.

Competition is keen for admission to dental hygiene schools. The minimum requirement for admission to a school of dental hygiene is graduation from high school. Several schools that offer the bachelor's degree admit students to the dental hygiene program only after they have completed 2 years of college. Many schools also require that applicants take an aptitude test given by the American Dental Hygienists' Association. Dental hygiene training given in the Armed Forces does not fully prepare one to pass the licensing exam, but credit for that training may be granted to those who seek admission to accredited dental hygiene programs.

The curriculum in a dental hygiene program consists of courses in the basic sciences, dental sciences, clinical science, and liberal arts. These schools offer laboratory, clinical, and classroom instruction in subjects such as anatomy, physiology, chemistry, pharmacology, nutrition, histology (the study of tissue structure), periodontology (the study of gum diseases), dental materials, and clinical dental hygiene.

People who want to become dental hygienists should be those who enjoy working with others. The ability to put patients at ease is helpful. Personal neatness and cleanliness, manual dexterity, and good health also are important qualities. Among the courses recommended for high school students interested in careers in this occupation are biology, health, chemistry, speech, and mathematics.

Employment Outlook

Employment opportunities for dental hygienists are expected to be good through the mid-1980's. Despite an anticipated rise in the number of graduates from schools of dental hygiene, the demand is expected to be greater than the number available for employment if recent trends in enrollments continue. There also should be very good opportunities for those desiring part-time employment, and for those willing to work in rural areas.

Employment of dental hygienists is expected to grow much faster than the average for all occupations, because of an expanding population and the growing awareness of the importance of regular dental care. Increased participation in dental prepayment plans and more group practice among dentists should result in new jobs for dental hygienists. Dental care programs for children also may lead to more employment opportunities in this field.

Earnings and Working Conditions

Earnings of dental hygienists are affected by the type of employer, education and experience of the individual hygienist, and the geographic location. Dental hygienists who work in private dental offices usually are salaried employees, although some are paid a commission for work performed, or a combination of salary and commission.

Dental hygienists working full time in private offices earned average salaries of about $12,900 a year in 1976, according to the limited data available. This salary was slightly above the average for all nonsupervisory workers in private industry, except farming. In 1977, the Federal Government paid dental hygienists with no experience starting salaries of $8,316 a year. Experienced dental hygienists working for the Federal Government earned average annual salaries of $10,500.

Dental hygienists employed full time in private offices usually worked between 35 and 40 hours a week. They may work on Saturdays or during evening hours. Some hygienists work for two dentists or more.

Dental hygienists usually work in clean, well-lighted offices. Important health protections for persons in this occupation are regular medical checkups and strict adherence to established procedures for using X-ray equipment and for disinfection.

Dental hygienists who work for school systems, health agencies, and the Federal or State governments have the same hours, vacation, sick leave, retirement, and health insurance benefits as other workers in these organizations.

Sources of Additional Information

For information about accredited programs and the educational requirements to enter this occupation, contact:

Office of Education, American Dental Hygienists' Association, 211 E. Chicago Ave., Chicago, Ill. 60611.

Other material on opportunities for dental hygienists is available from:

Division of Dentistry, Public Health Service, U.S. Department of Health, Education, and Welfare, 9000 Rockville Pike, Bethesda, Md. 20014.

The State Board of Dental Examiners in each State, or the National Board of Dental Examiners, 211 E. Chicago Ave., Chicago, Ill. 60611, can supply information on licensing requirements.

DENTISTS

(D.O.T. 072.108)

Nature of the Work

Dentists examine teeth and other tissues of the mouth to diagnose diseases or abnormalities. They take X-rays, fill cavities, straighten teeth, and treat gum diseases. Dentists extract teeth and substitute artificial dentures designed for the individual patient. They also perform corrective surgery of the gums and supporting bones. In addition, they may clean teeth.

Dentists spend most of their time with patients, but may devote some time to laboratory work such as making dentures and inlays. Most dentists, however—particularly those in large cities—send their laboratory work to commercial firms. Some dentists also employ dental hygienists to clean patients' teeth and provide instruction for patient self-care. (See statement on dental hygienists.) They also may employ other assistants who perform office work, assist in "chairside" duties, and provide therapeutic services under the supervision of the dentist.

Most dentists are general practitioners who provide many types of dental care; about 10 percent are specialists. The largest group of specialists are orthodontists, who

About 9 out of every 10 dentists are in private practice.

straighten teeth. The next largest group, oral surgeons, operate on the mouth and jaws. The remainder specialize in pedodontics (dentistry for children); periodontics (treating the gums); prosthodontics (making artificial teeth or dentures); endodontics (root canal therapy); public health dentistry; and oral pathology (diseases of the mouth).

About 4 percent of all dentists teach in dental schools, do research, or administer dental health programs on a full-time basis. Many dentists in private practice do this work on a part-time basis.

Places of Employment

About 112,000 dentists were at work in the United States in 1976—9 of every 10 were in private practice. About 5,000 served as commissioned officers in the Armed Forces, and about 1,400 worked in other types of Federal Government positions—chiefly in the hospitals and clinics of the Veterans Administration and the Public Health Service.

Training, Other Qualifications, and Advancement

A license to practice dentistry is required in all States and the District of Columbia. To qualify for a license in most States, a candidate must be a graduate of a dental school approved by the American Dental Association and pass written and practical examinations. In 1976, candidates in 48 States and the District of Columbia could fulfill part of the State licensing requirements by passing a written examination given by the National Board of Dental Examiners. Most State licenses permit dentists to engage in both general and specialized practice. In 14 States, however, a dentist cannot be licensed as a "specialist" without having 2 or 3 years of graduate education and, in some cases, passing a special State examination. In the other 36 states, the extra education also is necessary, but a specialist's practice is regulated by the dental profession, not the State licensing authority. In order to practice in a different State, a licensed dentist usually must pass the State's examination. However, at least 21 States grant licenses without further examination to dentists already licensed in other States on the basis of their credentials. Dentists who want to teach or do research usually spend an additional 2 to 4 years in advanced dental training in programs operated by dental schools, hospitals, and other institutions of higher education.

Dental colleges require from 2 to 4 years of predental education. However, of those students entering dental school in 1976, 85 percent had a baccalaureate or master's degree. Predental education must include courses in the sciences and humanities.

Competition is keen for admission to dental schools. In selecting students, schools give considerable weight to college grades and the amount of college education. In addition, all dental schools participate in a nationwide admission testing program, and scores earned on these tests are considered along with information gathered about the applicant through recommendations and interviews. Many State-supported dental schools also give preference to residents of their particular States.

Dental school training generally lasts 4 academic years although some institutions condense this into 3 calendar years. Studies begin with an emphasis on classroom instruction and laboratory work in basic sciences such as anatomy, microbiology, biochemistry, and physiology. Courses in clinical sciences and preclinical technique also are provided at this time. The last 2 years are spent chiefly in a dental clinic, treating patients.

The degree of Doctor of Dental Surgery (D.D.S.) is awarded by most dental colleges. An equivalent degree, Doctor of Dental Medicine (D.M.D.), is conferred by 19 schools.

Dental education is very costly because of the length of time required to earn the dental degree. However, Federal funds provide a limited number of loans for dental students, and a limited number of scholarships are available for qualifying students who agree to a minimum of 2 years' Federal service.

The profession of dentistry requires both manual skills and a high level of diagnostic ability. Dentists should have good visual memory, excellent judgment of space and shape, and a high degree of manual dexterity, as well as scientific ability. Good business sense, self-discipline, and the ability to instill confidence are helpful for success in private practice. High school students who want to become dentists are advised to take courses in biology, chemistry, health, and mathematics.

Most dental graduates open their own offices or purchase established practices. Some start in practice with established dentists, to gain experience and to save the money required to equip an office; others may enter residency training programs in approved hospitals. Dentists who enter the Armed Forces are commissioned as captains in the Army and Air Force and as lieutenants in the Navy. Graduates of recognized dental schools are eligible for Federal Civil Service positions and for commissions (equivalent to lieutenants in the Navy) in the U.S. Public Health Service.

Employment Outlook

Employment opportunities for dentists are expected to be good through the mid-1980's. Dental school enrollments have grown in recent years because of federally assisted construction of additional training facilities. As a result, the number of new entrants to the field is expected to fall short of the number needed to fill openings created by growth of the occupation and by death or retirement from the profession.

Employment of dentists is expected to grow about as fast as the average for all occupations due to population growth, increased awareness that regular dental care helps prevent and control dental diseases, and the expansion of prepayment arrangements, which make it easier for people to afford dental services. Fluoridation of community water supplies and improved dental hygiene may prevent some tooth and gum disorders, and preserve teeth that might otherwise be extracted. However, since the preserved teeth will need care in the future, these measures may increase rather than decrease the demand for dental care. Similarly, while new techniques, equipment, and drugs, as well as the expanded use of dental hygienists, assistants, and laboratory technicians should enable individual dentists to care for more patients, these developments are not expected to offset the need for more dentists.

There will continue to be a need for dentists to administer dental public health programs and teach in dental colleges. Also, many dentists will continue to serve in the Armed Forces.

Earnings and Working Conditions

During the first year or two of practice, dentists often earn little more than the minimum needed to cover expenses, but their earnings usually rise rapidly as their practice develops. Specialists generally earn considerably more than general practitioners. The average income of dentists in 1976 was about $39,500 a year, according to the limited information available. In the Federal Government, new graduates of dental schools could expect to start at $17,056 a year in 1977. Experienced dentists working for the Federal Government in 1977 earned average annual salaries of $31,600, with some earning as much as $39,600 a year.

Location is one of the major factors affecting the income of dentists who open their own offices. For example, in high-income urban areas, dental services are in great demand; however, a practice can be developed most quickly in small towns, where new dentists easily become known and where they may face less competition from established practitioners. Although the income from practice in small towns may rise rapidly at first, over the long run the level of earnings, like the cost of living, may be lower than it is in larger communities.

Most dental offices are open 5 days a week and some dentists have evening hours. Dentists usually work between 40 and 45 hours a week, although many spend more than 50 hours a week in the office. Dentists often work fewer hours as they grow older, and a considerable number continue in part-time practice well beyond the usual retirement age.

Sources of Additional Information

Persons who wish to practice in a given State should obtain the requirements for licensure from the board of dental examiners of that State. Lists of State boards and of accredited dental schools, as well as information on dentistry as a career, is available from:

American Dental Association, Council on Dental Education, 211 East Chicago Ave., Chicago, Ill. 60611.

American Association of Dental Schools, 1625 Massachusetts Ave. NW., Washington, D.C. 20036.

Information on dentistry as a career also is available from:

Division of Dentistry, Public Health Service, U.S. Department of Health, Education, and Welfare, 9000 Rockville Pike, Bethesda, Md. 20014.

Students should contact the director of student financial aid at the school they attend for information about Federal or other loans and scholarships.

DIETITIANS

(D.O.T. 077.081 through .168)

Nature of the Work

Dietitians plan nutritious and appetizing meals to help people maintain or recover good health. They also supervise the food service personnel who prepare and serve the meals, manage dietetic purchasing and accounting, and give advice on good eating habits. Clinical dietitians form the largest group in this occupation; the others are administrative, teaching, and research dietitians. Nutritionists also are included in this field.

Administrative dietitians apply the principles of nutrition and sound management to large-scale meal planning and preparation, such as that done in hospitals, universities, schools, and other institutions. They supervise the planning, preparation, and service of meals; select, train, and direct food service supervisors and workers; budget for and purchase food, equipment, and supplies; enforce sanitary and safety regulations; and prepare records and reports. Dietitians who are directors of a dietetic department also decide on departmental policy; coordinate dietetic service with the activities of other departments; and are responsible for the dietetic department budget, which in large organizations may amount to millions of dollars annually.

Clinical dietitians, sometimes called therapeutic dietitians, plan diets and supervise the service of meals to meet the nutritional needs of patients in hospitals, nursing homes, or clinics. Among their duties, clinical dietitians confer with doctors and other members of the health care team about patients' nutritional care, instruct patients and their families on the requirements and importance of their diets, and suggest ways to keep on these diets after leaving the hospital or clinic. In a small institution, one person may be both the administrative and clinical dietitian.

Research dietitians conduct, evaluate, and interpret research to improve the nutrition of both healthy and sick people. This research may be in nutrition science and education, food management, or food service systems and equipment. They may conduct studies of how the body uses food. Research projects may investigate the nutritional needs of the aging, or persons with a chronic disease, or space travelers. Research dietitians usually are employed in medical centers or education facilities, but also may work in community

Clinical dietitians plan meals for patients in hospitals, nursing homes, or clinics.

health programs. (See statement on food scientists elsewhere in the *Handbook*.)

Dietetic educators teach dietetics to dietetic, medical, dental, and nursing students and to interns, residents, and other members of the health care team. They usually work in medical and educational institutions.

Nutritionists may counsel individuals and groups on sound nutrition practices to maintain and improve health or they may engage in teaching and research. This work covers such areas as special diets, meal planning and preparation, and food budgeting and purchasing. Nutritionists in community health may be responsible for the nutrition components of preventive health and medical care services. This includes planning, developing, coordinating, and administering a nutrition program or a nutrition component as an integral part of a community health program. Nutritionists work in such diverse areas as food industries, educational and health facilities, and agricultural and welfare agencies, both public and private.

An increasing number of dietitians work as consultants to hospitals and to health-related facilities. Others act as consultants to commercial enterprises, including food processors and equipment manufacturers.

Places of Employment

About 45,000 persons worked as dietitians in 1976. More than one-half work in hospitals, nursing homes, and clinics, including about 1,100 in the Veterans Administration and the U.S. Public Health Service. Colleges, universities, and school systems employ a large number of dietitians as teachers or in food service systems. Most of the rest work for health-related agencies, restaurants or cafeterias, and large companies that provide food service for their employees. Some dietitians are commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

A bachelor's degree, preferably with a major in foods and nutrition or institution management, is the basic educational requirement for dietitians. This degree can be earned in about 240 colleges and universities, usually in departments of home economics. College courses usually required are in food and nutrition, institution management, chemistry, bacteriology, physiology, and related courses such as mathematics, data processing, psychology, sociology, and economics.

For a dietitian to qualify for professional recognition, the American Dietetic Association (ADA) recommends the completion after graduation of an approved dietetic internship or an approved individual traineeship program. The internship lasts 6 to 12 months and the traineeship program 1 to 2 years. Both programs combine clinical experience under a qualified dietitian with some classroom work. In 1976, 68 internship programs were approved by the American Dietetic Association. A growing number of coordinated undergraduate programs, located in schools of medicine and in allied health and home economics departments of both colleges and universities, enable students to complete both the requirements for a bachelor's degree and the clinical experience requirement in 4 years. The ADA approves coordinated undergraduate programs.

Persons meeting the qualifications established by the ADA's Commission on Dietetic Registration can become Registered Dietitians (R.D.'s). Registration with the ADA is acknowledgement of a dietitian's competence.

Experienced dietitians may advance to assistant or associate director or director of a dietetic department. Advancement to higher level positions in teaching and research usually requires graduate education; public health nutritionists must earn a graduate degree in this field. Graduate study in institutional or business administration is valuable to those interested in administrative dietetics.

Persons who plan to become dietitians should have organizational and administrative ability, as well as high scientific aptitude, and should be able to work well with a variety of people. Among the courses recommended for high school students interested in careers as dietitians are home economics, business administration, biology, health, mathematics, and chemistry.

Employment Outlook

Employment opportunities for qualified dietitians on both a full-time and part-time basis are expected to be good through the mid-1980's. In recent years, employers have used dietetic assistants trained in vocational and technical schools and dietetic technicians educated in junior colleges to help meet the demand for dietetic services. Because this situation is likely to persist, employment opportunities also should continue to be favorable for graduates of these programs.

Employment of dietitians is expected to grow about as fast as the average for all occupations through the mid-1980's to meet the food management needs of hospitals and extended care facilities, industrial plants, and restaurants. Dietitians also will be needed to staff community health programs and to conduct research in food and nutrition. In addition to new dietitians needed because of occupational growth, many others will be required each year to replace those who die, retire, or leave the profession for other reasons.

Earnings and Working Conditions

Starting salaries of hospital dietitians averaged $11,300 a year in 1976, according to a national survey conducted by the University of Texas Medical Branch. Experienced dietitians received annual salaries ranging from $13,900 to $25,300, according to the American Dietetic Association. The median salary paid by colleges and universities to dietitians with bachelor's degrees was $13,900 a year in 1976. The median salary for those with bachelor's degrees working in commercial or industrial establishments was $14,400 a year; for those in public and voluntary health agencies, $13,000. For self-employed dietitians with a bachelor's degree, the median salary was over $16,000 a year in 1976.

The entrance salary in the Federal Government for those completing an approved internship was $11,523 in 1977. Beginning dietitians with a master's degree who had completed an internship earned $14,097. In 1977, the Federal Government paid experienced dietitians average salaries of $18,109 a year.

Most dietitians work 40 hours a week; however, dietitians in hospitals may sometimes work on weekends, and those in commercial food service have somewhat irregular hours. Some hospitals provide laundry service in addition to salary. Dietitians usually receive paid vacations, holidays, and health insurance and retirement benefits.

Sources of Additional Information

For information on approved dietetic internship programs, scholarships, employment opportunities, and registration, and a list of colleges providing training for a professional career in dietetics, contact:

The American Dietetic Association, 430 North Michigan Ave., 10th floor, Chicago, Ill. 60611.

The U.S. Civil Service Commission, Washington, D.C. 20415, will send information on the requirements for dietetic interns and dietitians in Federal Government hospitals and for public health nutritionists and dietitians in the Public Health Service, U.S. Department of Health, Education, and Welfare, and in the District of Columbia government programs.

DRAFTERS

(D.O.T. 001.281, 002.281, 003.281,
005.281, 007.281, 010.281,
014.281, and 017.)

Nature of the Work

When building a space capsule, television set, or bridge, workers follow drawings that show the exact dimensions and specifications of the entire object and each of its parts. Workers who draw these plans are drafters.

Drafters prepare detailed drawings based on rough sketches, specifications, and calulations made by scientists, engineers, architects, and designers. They also calculate the strength, quality, quantity, and cost of materials. Final drawings contain a detailed view of the object from all sides as well as specifications for materials to be used, procedures followed, and other information to carry out the job.

In preparing drawings, drafters use compasses, dividers, protractors, triangles, and other drafting devices. They also use engineering handbooks, tables, and calculators to help resolve technical problems.

Drafters are classified according to the work they do or their level of responsibility. *Senior drafters* translate an engineer's or architect's preliminary plans into design "layouts" (scale drawings of the object to be built). *Detailers* draw each part shown on the layout, and give dimensions, materials, and other information to make the drawing clear and complete. *Checkers* carefully examine drawings for errors in computing or recording dimensions and specifications. Under the supervision of experienced drafters, *tracers* make minor corrections and trace drawings for reproduction on paper or plastic film.

Drafters usually specialize in a particular field of work, such as mechanical, electrical, electronic, aeronautical, structural, or architectural drafting.

Places of Employment

About 320,000 persons worked as drafters in 1976—more than 9 out of 10 worked in private industry. Engineering and architectural firms employed about 3 out of the 10. Other major employers included the fabricated metals, electrical equipment, machinery, and construction industries.

About 20,000 drafters worked for Federal, State, and local governments in 1976. Most drafters in the Federal Government worked for the Defense Department; those in State and local governments were mainly in highway and public works departments. Another several thousand

Drafters may specialize in mechanical, electrical, aeronautical, structural, or architectural drafting.

drafters worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Persons interested in becoming drafters can acquire the necessary training in technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools. Some persons receive training and experience in the Armed Forces. Others qualify through on-the-job training programs combined with part-time schooling or 3- to 4-year apprenticeship programs.

Training for a career in drafting, whether in a hign school or posthigh school program, should include courses in mathematics, physical sciences, mechanical drawing, and drafting. Shop practices and shop skills also are helpful since many higher level drafting jobs require knowledge of manufacturing or construction methods. Many technical schools offer courses in structural design, architectural drawing, and engineering or industrial technology.

Those planning careers in drafting should be able to do freehand drawings of three-dimensional objects and also detailed work requiring a high degree of accuracy. They should have good eyesight and manual dexterity. In addition, they should be able to function as part of a team since they work directly with engineers, architects, and skilled workers. Artistic ability is helpful in some specialized fields.

High school graduates usually start out as tracers. Those having posthigh school technical training may begin as junior drafters. After gaining experience, they may advance to checkers, detailers, senior drafters, or supervisors. Some may become independent designers. Courses in engineering and mathematics sometimes enable drafters to transfer to engineering positions.

Employment Outlook

Employment of drafters is expected to increase faster than the average for all occupations. This growth, along with the need to replace those who retire, die, or move into other fields of work, should provide favorable job opportunities through the mid-1980's. Holders of an associate (2-year) degree in drafting will have the best prospects. Many large employers already require postsecondary technical education, though well-qualified high school graduates who have studied drafting may find opportunities in some types of jobs.

Employment of drafters is expected to rise rapidly as a result of the increasingly complex design problems of modern products and processes. In addition, more support personnel will be needed as the employment of engineers and scientists grows. Photoreproduction of drawings and expanding use of electronic drafting equipment and computers, however, will reduce the need for less skilled drafters.

Earnings and Working Conditions

In private industry, tracers averaged about $8,400 a year in 1976, while more experienced drafters averaged between $9,800 and $12,000 a year. Senior drafters averaged about $15,300 a year in 1976. On the average, experienced drafters earn about one and one-half times as much as the average earnings of nonsupervisory workers in private industry, except farming.

The Federal Government paid drafters having an associate degree starting salaries of $8,316 a year in 1977. Those with less education or experience generally started at $7,408. The average Federal Government salary for all drafters was about $11,000 a year.

Although drafters usually work in well-lighted and well-ventilated rooms, they often must sit for long periods of time doing very detailed work. Occasionally, drafters may visit other offices or construction sites to gain first-hand information about a certain assignment.

Sources of Additional Information

General information on careers for drafters is available from:

American Institute for Design and Drafting,
3119 Price Rd., Bartlesville, Okla. 74003.

International Federation of Professional and
Technical Engineers, 1126 16th St. NW.,
Washington, D.C. 20036.

See Sources of Additional Information in the statement on engineering and science technicians elsewhere in the *Handbook*.

ECONOMISTS

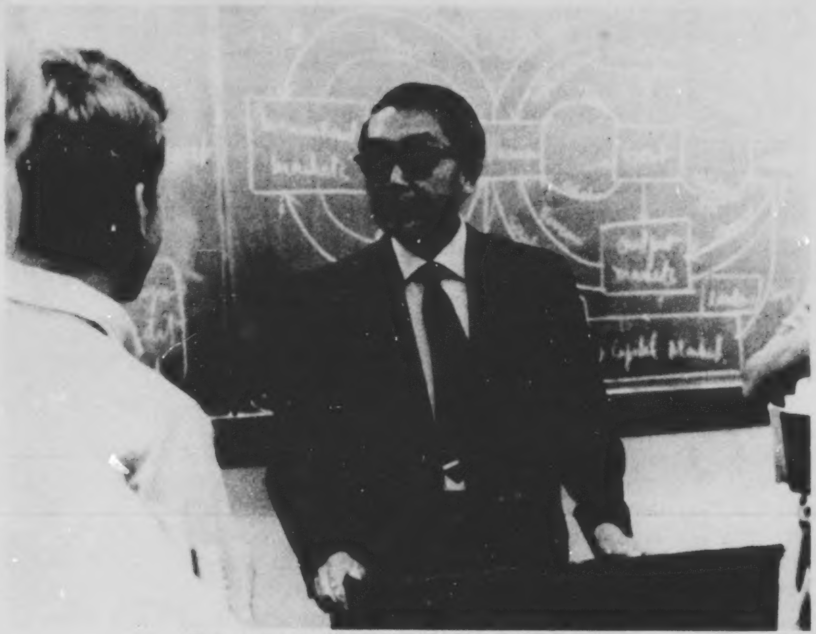
(D.O.T. 050.088 and .118)

Nature of the Work

Economists are concerned with how to utilize scarce resources such as land, raw materials, and human resources to provide goods and services for society. Economists analyze the relationship between the supply and demand of goods and services and study how they are produced, distributed, and consumed. Some economists are concerned with specific fields such as farm, wage, tax, and tariff problems and policies, while others attempt to develop theories explaining the causes of employment and unemployment or inflation. Most economists analyze and interpret a wide variety of economic data in the course of their work.

Economists in colleges and universities are engaged primarily in teaching the theories, principles, and methods of economics. In addition, economics faculty members often are involved in research, writing, and other nonteaching activities. They frequently act as consultants to business firms, government agencies, or individuals.

Economists in government collect and analyze data and prepare studies used to assess economic conditions and the need for changes in government policy. Most government economists are in the fields of agriculture, forestry, business, finance, labor, transportation, or international trade and development. For example, economists in the U.S. Department of Commerce study domestic production, distribution, and consumption of commodities or services; in the Federal Trade Commission, economists prepare economic evidence or industry analyses to assist in



Economics is the largest social science field.

enforcing Federal statutes designed to eliminate unfair, deceptive, or monopolistic practices in interstate commerce; economists in the Bureau of Labor Statistics assist in survey planning and analyze data on prices, wages, employment, and productivity.

Economists who work for business firms provide management with information to make decisions on marketing and pricing of company products; analyze the effect of government policies on business or international trade; or look at the advisability of adding new lines of merchandise, opening new branch operations, or otherwise expanding the company's business. Business economists working for firms that carry on extensive operations abroad may be asked to prepare short- and long-term forecasts of foreign economies as well as forecasts of the U.S. economy.

Places of Employment

Economics is the largest social science field. About 115,000 persons worked as economists in 1976, excluding those teaching in secondary schools. About 3 out of 4 of these jobs are in private industry or research organizations. Important employers of economists include manufacturing firms, banks, insurance companies, securities and investment companies, and management consulting firms. Colleges and universities employ about 10 percent of the Nation's economists while government agencies, primarily Federal, employ another 10 percent. Some economists run their own consulting businesses.

Economists work in all large cities and university towns. The largest number are in the New York City and the Washington, D.C. metropolitan areas. Some work overseas, mainly for the U.S. Department of State including the Agency for International Development.

Training, Other Qualifications, and Advancement

Economists must have a thorough understanding of economic theory and of mathematical methods of economic analysis. Since many beginning jobs for economists in government and business involve the collection and compilation of data, a thorough knowledge of basic statistical procedures is required. In addition to courses in macroeconomics, microeconomics, econometrics, and business and economic statistics, training in computer science is highly recommended.

At the undergraduate level, courses in one or more of the following subjects also are valuable: business cycles; economic and business history; economic development of selected areas; money and banking; international economics; public finance; industrial organization; labor economics; comparative economic systems, economics of national planning; urban economic problems and policies; marketing principles and organization; consumer analysis; organizational behavior; and business law.

A bachelor's degree with a major in economics is sufficient for many beginning research, administrative, management trainee, and business sales jobs. However, graduate training increasingly is required for advancement to more responsible positions as economists. Areas of specialization at the graduate level include advanced economic theory, comparative economic systems and planning, econometrics, economic development, economic history, environmental and natural resource economics, history of economic thought, industrial organization, institutional economics, international economics, labor economics, monetary economics, public finance, regional and urban economics, and social policy. Students should select graduate schools strong in specialties in which they are interested. Some schools help graduate students find part-time employment in nearby government or private organizations engaged in economic research where students may gain valuable experience.

In the Federal Government, candidates for entrance positions must have a minimum of 21 semester hours of economics and 3 hours of statistics, accounting, or calculus.

A master's degree generally is the minimum requirement for a job as a college instructor in many junior colleges and small 4-year schools. In many large colleges and universities, completion of all the requirements for a Ph. D. degree, except the dissertation, is necessary for appointment as a teaching assistant or instructor. The Ph. D. degree usually is required for a professorship and almost always is necessary to gain tenure.

In government, industry, research organizations, and consulting firms, economists who have a graduate degree usually can qualify for more responsible research and administrative positions. Experienced business economists may advance to managerial or executive positions in banks, industrial concerns, trade associations and other organizations where they formulate practical business and administrative policy.

About 1,500 colleges and universities offer bachelor's degree programs in economics; about 230, master's; and about 120, doctoral programs.

Persons who consider careers as economists should be able to work accurately and in detail since much time is spent on careful analysis of data. Frequently, the ability to work as part of a team is required. Economists must be objective in their work and be able to express themselves effectively both orally and in writing.

Employment Outlook

Employment of economists is expected to grow faster than the average for all occupations through the mid-1980's. However, most openings will result from deaths, retirements, and other separations from the labor force.

Private industry and business will continue to provide the largest number of employment opportunities for economists because of the increasing complexity of the domestic and international economies and the increased reliance on quantitative methods of analyzing business trends, forecasting sales, and planning purchases and production operations. Employers will seek those well-trained in econometrics and statistics. In addition, the increasing need for business economists to assist lawyers, accountants, engineers, and other professionals in solving problems should stimulate employment growth. Employment of economists in State and local government agencies is expected to increase because of the growing responsibilities of local governments in areas such as housing, transportation, environment and natural resources, health, and employment development and training. Employment of economists in the Federal Government is expected to rise slowly—in line with the rate of growth projected for the Federal work force as a whole. Colleges and universities, the traditional employer of many highly qualified economists, are not expected to significantly increase employment. As a result, many such economists may seek nonacademic positions.

Persons who graduate with a bachelor's degree in economics through the mid-1980's are likely to face keen competition for jobs as economists. However, many of these degree holders will find employment in government, industry, and business as management or sales trainees, or as research assistants. Candidates who hold master's degrees in economics face very strong competition for teaching positions in colleges and universities, but they should find good opportunities for administrative, research, and planning positions in private industry and government. Ph. D.'s are likely to face competition for academic positions, although those graduating from high-ranking universities should have an advantage. Ph. D.'s should have favorable opportunities in government, industry, research organizations, and consulting firms.

Economists specializing in the environment, energy and natural resources, health, and transportation are expected to have good job opportunities. However, since practicing economists may shift from one specialty to another, fields of specialization offering favorable job opportunities may change over short periods of time. A strong background in economic theory and econometrics provides the tools for acquiring any specialty within the field.

Earnings

According to the 1975-76 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,000 a year; master's degree candidates in the social sciences, around $12,000; bachelor's degree candidates offered positions in the field of finance and economics, around $10,600.

According to an American Economic Association survey, average salary offers made to new Ph. D.'s for the academic year 1975-76 were as follows: in colleges and universities, around $13,100 to $14,600 for the 9-month academic year; in business and industry, $18,000 a year; in banking and finance, $17,775 a year; in consulting and research, $17,500 a year; in the Federal Government, $18,750 a year; and in State and local government, $15,500 a year. Average salaries of economists employed in colleges and universities for the academic year 1975-76 were as follows: for professors, about $25,400; for associate professors, about $18,700; for assistant professors, about $15,300; and for instructors, about $12,100.

Economists who have a Ph. D. generally are paid higher salaries than those who have lesser degrees and similar experience. A substantial number of economists supplement their salaries by consulting, teaching, and research activities. In general, salaries of experienced economists are much higher than the average for all nonsupervisory workers in private industry, except farming.

The Civil Service Commission recognizes education and experience in certifying applicants for entry level positions in the Federal Government. In general, the entrance salary for economists having a bachelor's degree was $9,303 a year in 1977; however, those with superior academic records could begin at $11,523. Those having a master's degree could qualify for positions at an annual salary of $14,097, while those with a Ph. D. could begin at $17,056. Economists in the Federal Government averaged around $25,100 in 1977. Economists work in many government agencies, primarily in the Departments of State, Treasury, Army, Interior, Agriculture, Commerce, Labor, Health, Education, and Welfare, Housing and Urban Development, and Transportation.

Sources of Additional Information

For information on job openings for economists with graduate degrees and on schools offering graduate training in economics, contact:

American Economic Association, 1313 21st Avenue South, Nashville, Tenn. 37212.

For additional information on careers in business economics, contact:

National Association of Business Economists, 28349 Chagrin Blvd., Suite 201, Cleveland, Ohio 44122.

ENGINEERING AND SCIENCE TECHNICIANS

(D.O.T. 002. through 029.)

Nature of the Work

Knowledge of science, mathematics, industrial machinery, and technical processes enables engineering and science technicians to work in all phases of business and government, from research and design to manufacturing, sales, and customer service. Although their jobs are more limited in scope and more practically oriented than those of engineers or scientists, technicians often apply the theoretical knowledge developed by engineers and scientists to actual situations. Technicians frequently use complex electronic and mechanical instruments, experimental laboratory equipment, and drafting instruments. Almost all technicians described in this statement must be able to use technical handbooks and computing devices such as slide rules and calculating machines.

In research and development, one of the largest areas of employment, technicians set up experiments and calculate the results using complex instruments. They also assist engineers and scientists in developing experimental equipment and models by making drawings and sketches and, frequently, by doing routine design work.

In production, technicians usually follow the plans and general directions of engineers and scientists, but often without close supervision. They may prepare specifications for materials, devise tests to insure product quality, or study ways to improve the efficiency of an operation. They often supervise production workers to make sure they follow prescribed plans and procedures. As a product is built, technicians check to see that specifications are followed, keep engineers and scientists informed as to progress, and investigate production problems.

As sales workers or field representatives for manufacturers, technicians give advice on installation and maintenance of complex machinery, and may write specifications and technical manuals. (See statement on technical writers elsewhere in the *Handbook*.)

Technicians may work in the fields of engineering, physical science, or life science. Within these general fields, job titles may describe the level (biological aide or biological technician), duties (quality control technician or time study analyst), or area of work (mechanical, electrical or chemical).

As an engineering technician, one might work in any of the following areas:

Aeronautical Technology. Technicians in this area work with engineers and scientists to design and produce aircraft, rockets, guided missiles, and spacecraft. Many aid engineers in preparing design layouts and models of structures, control systems, or equipment installations by collecting information, making computations, and performing laboratory tests. For example, a technician might estimate weight factors, centers of gravity, and other items affecting load capacity of an airplane or missile. Other technicians prepare or check drawings for technical accuracy, practicability, and economy.

Aeronautical technicians frequently work as manufacturers' field service representatives, serving as the link between their company and the military services, commercial airlines, and other customers. Technicians also prepare technical information for instruction manuals, bulletins, catalogs, and other literature. (See statements on aerospace engineers, airplane mechanics, and occupations in aircraft, missile, and spacecraft manufacturing elsewhere in the *Handbook*.)

Air-Conditioning, Heating, and Refrigeration Technology. Air-conditioning, heating, and refrigeration technicians design, manufacture, sell, and service equipment to regulate interior temperatures. Technicians in this field often specialize in one area, such as refrigeration, and sometimes in a particular type of activity, such as research and development.

When working for firms that manufacture temperature-controlling equipment, technicians generally work in research and engineering departments, where they assist engineers and scientists in the design and testing of new equipment or production methods. For example, a technician may construct an experimental model to test its durability and operating characteristics. Technicians also work as sales workers for equipment manufacturers or dealers, and must be able to supply engineering firms and other contractors that design and install systems with information on installation, maintenance, operating costs, and the performance specifications of the equipment. Other technicians work for contractors, where they help design and prepare installation instructions for air-conditioning, heating, or refrigeration systems. Still others work in customer service, and are responsible for supervising the installation and maintenance of equipment. (See statement on refrigeration and air-conditioning mechanics elsewhere in the *Handbook*.)

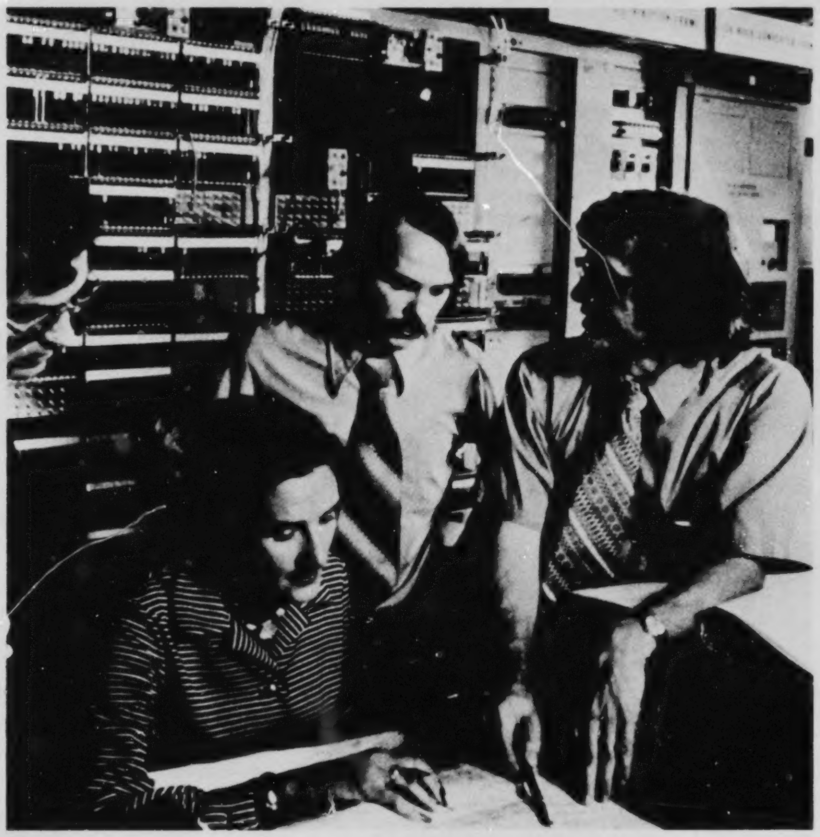
Civil Engineering Technology. Technicians in this area assist civil engineers in planning, designing, and constructing highways, bridges, dams, and other structures. They often specialize in one area such as highway or structural technology. During the planning stage, they estimate costs, prepare specifications for materials, or participate in surveying, drafting, or designing. Once construction begins, they assist the contractor or superintendent in scheduling construction activities or inspecting the work to assure conformance to blueprints and specifications. (See statements on civil engineers, drafters, and surveyors elsewhere in the *Handbook*.)

Electronics Technology. Technicians in this field develop, manufacture, and service electronic equipment and systems. The types of equipment range from radio, radar, sonar, and television to industrial and medical measuring or control devices, navigational equipment, and electronic computers. Because the field is so broad, technicians often specialize in one area such as automatic control devices or electronic amplifiers. Furthermore, technological advancement is constantly opening up new areas of work. For example, the development of printed circuits stimulated the growth of miniaturized electronic systems.

When working in design, production, or customer service, electronic technicians use sophisticated measuring and diagnostic devices to test, adjust, and repair equipment. In many cases, they must understand the requirements of the field in which the electronic device is being used. In designing equipment for space exploration, for example, they must consider the need for minimum weight and volume and maximum resistance to shock, extreme temperature, and pressure. Some electronics technicians also work in technical sales, while others work in the radio and television broadcasting industry. (See statements on broadcast technicians and occupations in radio and television broadcasting elsewhere in the *Handbook*.)

Industrial Production Technology. Technicians in this area, usually called industrial or production technicians, assist industrial engineers on problems involving the efficient use of personnel, materials, and machines to produce goods and services. They prepare layouts of machinery and equipment, plan the flow of work, make statistical studies, and analyze production costs. Industrial technicians also conduct time and motion studies (analyze the time and movements a worker needs to accomplish a task) to improve the production methods and procedures in manufacturing plants.

Many industrial technicians acquire experience that enables them to qualify for other jobs. For example, those specializing in machinery and production methods may move into industrial safety. Others, in job analysis, may set job standards and interview, test, hire, and train personnel. Still others may move into production supervision. (See statements on personnel workers and industrial engineers elsewhere in the *Handbook*.)



Since technicians are part of a scientific team, they sometimes work under the supervision of engineers and scientists.

Mechanical Technology. Mechanical technology is a broad term that covers a large number of specialized fields including automotive technology, diesel technology, tool design, machine design, and production technology.

Technicians assist engineers in design and development work by making freehand sketches and rough layouts of proposed machinery and other equipment and parts. This work requires knowledge of mechanical principles involving tolerance, stress, strain, friction, and vibration factors. Technicians also analyze the costs and practical value of designs.

In planning and testing experimental machines and equipment for performance, durability, and efficiency, technicians record data, make computations, plot graphs, analyze results, and write reports. They sometimes recommend design changes to improve performance. Their job often requires skill in the use of complex instruments, test equipment, and gauges, as well as in the preparation and interpretation of drawings.

When a product is ready for production, technicians help prepare layouts and drawings of the assembly process and of parts to be manufactured. They frequently help estimate labor costs, equipment life, and plant space. Some mechanical technicians test and inspect machines and equipment in manufacturing departments or work with engineers to eliminate production problems. Others are technical sales workers.

Tool designers are among the better known specialists in mechanical engineering technology. Tool designers prepare sketches of the designs for cutting tools, jigs, dies, special fixtures, and other devices used in mass production. Frequently, they redesign existing tools to improve their efficiency. They also make or supervise others in making detailed drawings of tools and fixtures.

Machine drafting, with some designing, is another major area often grouped under mechanical technology and is described in the statement on drafters. (Also see statements on mechanical engineers, automobile mechanics, manufacturers' sales workers, and diesel mechanics elsewhere in the *Handbook*.)

Instrumentation Technology. Automated manufacturing and industrial processes, oceanographic and space exploration, weather forecasting, satellite communication systems, environmental protection, and medical research have helped to make instrumentation technology a fast-growing field for technicians. They help develop and design complex measuring and control devices such as those in a spacecraft that sense and measure changes in heat or pressure, automatically record data, and make necessary adjustments. These technicians have extensive knowledge of physical sciences as well as electrical-electronic and mechanical engineering. (See statement on instrument workers elsewhere in the *Handbook*.)

Several areas of opportunity exist in the physical sciences:

Chemical technicians work with chemists and chemical engineers to develop, sell, and utilize chemical and related products and equipment.

Most chemical technicians do research and development, testing, or other laboratory work. They often set up and conduct tests on processes and products being developed or improved. For example, a technician may examine steel for carbon, phosphorus, and sulfur content or test a lubricating oil by subjecting it to changing temperatures. The technician measures reactions, analyzes the results of experiments, and records data that will be the basis for decisions and future research.

Chemical technicians in production generally put into commercial operation those products or processes developed in research laboratories. They assist in making the final design, installing equipment, and training and supervising operators on the production line. Technicians in quality control test materials, production processes, and final products to insure that they meet the manufacturer's specifications and quality standards. Many also work as technical sales personnel, selling chemicals or chemical products.

Many chemical technicians use computers and instruments, such as a dilatometer (which measures the expansion of a substance). Because the field of chemistry is so broad, chemical technicians frequently specialize in a particular industry such as food processing or pharmaceuticals. (See statements on chemists, chemical engineers, and occupations in the industrial chemical industry elsewhere in the *Handbook*.)

Meteorological technicians support meteorologists in the study of atmospheric conditions. Technicians calibrate instruments, observe, record, and report meteorological occurrences, and assist in research projects and the development of scientific instruments.

Geological technicians assist geologists in evaluating earth processes. Currently much research is being conducted in seismology, petroleum and mineral exploration, and ecology. These technicians install seismographic instruments, record measurements from these instruments, assist in field evaluation of earthquake damage and surface displacement, or assist geologists in earthquake prediction research. In petroleum and mineral exploration, they help conduct tests and record sound wave data to determine the likelihood of successful drilling, or use radiation detection instruments and collect core samples to help geologists evaluate the economic possibilities of mining a given resource.

Hydrologic technicians gather data to help hydrologists predict river stages and water quality levels. They monitor instruments that measure water flow, water table levels, or water quality, and record and analyze the data obtained. (See statement on environmental scientists elsewhere in the *Handbook*.)

Technician positions in the life sciences generally are classified into two categories:

Agricultural technicians work with agricultural scientists in the areas of food production and processing. Plant technicians conduct tests and experiments to improve the yield and quality of crops, or to increase resistance to disease, insects, or other hazards. Technicians in soil science analyse the chemical and physical properties of various soils to help determine the best uses for these soils. Animal husbandry technicians work mainly with the breeding and nutrition of animals. Other agricultural technicians are employed in the food industry as food processing technicians. They work in quality control or in food science research, helping food scientists develop better and more efficient ways of processing food material for human consumption. (See statement on food scientists elsewhere in the *Handbook*.)

Biological technicians work primarily in laboratories where they perform tests and experiments under controlled conditions. Microbiological technicians study microscopic organisms and may be involved in immunology or parasitology research. Laboratory animal technicians study and report on the reaction of laboratory animals to certain physical and chemical stimuli. They also study and conduct research to help biologists develop cures that may be applied to human diseases. Biochemical technicians assist biochemists in the chemical analysis of biological substances (blood, other body fluids, foods, drugs). Most of their work involves conducting experiments and reporting their results to a biochemist. As a biological technician, one might also work primarily with insects, studying insect control, developing new insecticides, or determining how to use insects to control other insects or undesirable plants. (See statements on life scientists elsewhere in the *Handbook*.)

Technicians also specialize in fields such as metallurgical (metal), electrical, and optical technology. In the atomic energy field, technicians work with scientists and engineers on problems of radiation safety, inspection, and decontamination. (See statement on occupations in the atomic energy field elsewhere in the *Handbook*.) New areas of work include environmental protection, where technicians study the problems of air and water pollution, and industrial safety.

Places of Employment

Over 585,000 persons worked as engineering and science technicians in 1976. Almost 400,000 worked in engineering fields, about 130,000 in the physical science occupations, and about 55,000 in the life sciences.

About two-thirds of all technicians worked in private industry. In the manufacturing sector, the largest employers were the electrical equipment, chemical, machinery, and aerospace industries. In nonmanufacturing, large numbers worked in wholesale and retail trade, communications, and in engineering and architectural firms.

In 1976, the Federal Government employed about 95,000 technicians, chiefly as engineering and electronics technicians, equipment specialists, biological technicians, cartographic technicians (mapmaking), meteorological technicians, and physical science technicians. The largest number worked for the Department of Defense; most of the others worked for the Departments of Transportation, Agriculture, Interior, and Commerce.

State government agencies employed nearly 50,000 engineering and science technicians, and local governments about 11,500. The remainder worked for colleges and universities and nonprofit organizations.

Training, Other Qualifications, and Advancement

Although persons can qualify for technician jobs through many combinations of work experience and education, most employers prefer applicants who have had some specialized technical training. Specialized training is available at technical institutes, junior and community colleges, area vocational-technical schools, extension divisions of colleges and universities, and vocational-technical high schools. Some engineering and science students who have not completed the bachelor's degree and others who have degrees in science and mathematics also are able to qualify for technician positions.

Persons also can qualify for technician jobs by less formal methods. Workers may learn through on-the-job training, apprenticeship programs, or correspondence schools. Some qualify on the basis of experience gained in the Armed Forces. However, postsecondary training is becoming increasingly necessary for advancement to more responsible jobs.

Some of the types of postsecondary and other schools that provide technical training are discussed in the following paragraphs:

Technical Institutes. Technical institutes offer training to qualify students for a job immediately after graduation with a minimum of on-the-job training. In general, students receive intensive technical training but less theory and general education than in engineering schools or liberal arts colleges. A few technical institutes and community colleges offer cooperative programs in which students spend part of the time in school and part in paid employment related to their studies.

Some technical institutes operate as regular or extension divisions of colleges and universities. Other institutions are operated by States and municipalities, or by private organizations.

Junior and Community Colleges. Curriculums in junior and community colleges which prepare students for technician occupations are similar to those in technical institutes, but with more emphasis on theory and liberal arts course work. After completing the 2-year programs, some graduates qualify for technician jobs while others continue their education at 4-year colleges. Most large community colleges offer 2-year technical programs, and many employers prefer graduates who have more specialized training.

Area Vocational-Technical Schools. These postsecondary public institutions serve students from surrounding areas and train them for jobs in the local area. Most of these schools require a high school degree or its equivalent for admission.

Other Training. Some large corporations conduct training programs and operate private schools to meet their needs for technically trained personnel in specific jobs; such training rarely includes general studies. Training for some technician occupations, for instance tool designers and electronic technicians, is available through formal 2- to 4-year apprenticeship programs. The apprentice gets on-the-job training under the close supervision of an experienced technician and related technical knowledge in classes, usually after working hours.

The Armed Forces have trained many technicians, especially in electronics. Although military job requirements generally are different from those in the civilian economy, military technicians often are able to find employment with only minimal additional training.

Technician training also is available from many private technical and correspondence schools that often specialize in a single field such as electronics. Some of these schools are owned and operated by large corporations that have the resources to provide very up-to-date training in a technical field.

Those interested in a career as a technician should have an aptitude for mathematics and science and enjoy technical work. An ability to do detailed work with a high degree of accuracy is necessary; for design work, creative talent also is desirable. Since technicians are part of a scientific team, they sometimes must work under the close supervision of engineers and scientists as well as with other technicians and skilled workers. Some technicans, such as repair and maintenance technicians, should be able to deal effectively with customers requiring their services.

Engineering and science technicians usually begin work as trainees in routine positions under the direct supervision of an experienced technician, scientist, or engineer. As they gain experience, they receive more responsibility and carry out a particular assignment under only general supervision. Technicians may eventually move into supervisory positions. Those who have the ability and obtain additional education sometimes are promoted to positions as scientists or engineers.

Employment Outlook

Employment opportunities for engineering and science technicians are expected to be favorable through the mid-1980's. Opportunities will be best for graduates of postsecondary school technician training programs. Besides the openings resulting from the faster-than-average growth expected in this field, additional technicians will be needed to replace those who die, retire, or leave the occupation.

Industrial expansion and the increasing complexity of modern technology underlie the anticipated increase in demand for technicians. Many will be needed to work with the growing number of engineers and scientists in developing, producing, and distributing new and technically advanced products. Automation of industrial processes and growth of new areas of work such as environmental protection and urban development will add to the demand for technical personnel.

The anticipated growth of research and development expenditures in industry and government should increase requirements for technicians.

Because space and defense programs are major factors in the employment of technical personnel, expenditures in these areas affect the demand for technicians. The outlook for technicians is based on the assumption that defense spending will increase from the 1976 level by the mid-1980's, but will still be slightly lower than the levels of the late 1960's. If defense spending should differ substantially from this level, the demand for technicians would be affected accordingly.

Earnings

In private industry in 1976, average starting salaries for 2-year graduates ranged from about $9,000 to $10,800 a year, while those who did not complete a 2-year program earned average starting salaries from just over $6,400 to about $9,300. Senior engineering technicians in private industry earned average salaries of about $16,000 a year.

Starting salaries for all technicians in the Federal Government were fairly uniform in 1977. A high school graduate with no experience could expect $6,572 annually to start. With an associate degree, the starting salary was $8,316, and with a bachelor's, $9,303 or $11,523. At higher experience levels, however, differences in earnings are significant. The average annual salary for all engineering technicians employed by the Federal Government in 1977 was $17,800; for physical science technicians, $17,100; and for life science technicians, about $11,400.

Sources of Additional Information

For information on careers for engineering and science technicians and engineering and technology programs, contact:

Engineers Council for Professional Development, 345 East 47th St., New York, N.Y. 10017.

Information on schools offering technician programs is available from:

National Association of Trade and Technical Schools, Accrediting Commission, 2021 L St. NW., Washington, D.C. 20036.

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

State departments of education also have information about approved technical institutes, junior colleges, and other educational institutions within the State offering post-high school training for specific technical occupations. Other sources include:

American Association of Community and Junior Colleges, Suite 410, 1 Dupont Circle, Washington, D.C. 20036.

National Home Study Council, 1601 18th St. NW., Washington, D.C. 20009.

ENGINEERS

The work of engineers affects our lives in thousands of different ways. Their past accomplishments have enabled us to drive safer automobiles, reach the moon, and even prolong life through special machinery. Future accomplishments could help us increase energy supplies, develop more pollution-free powerplants, and aid medical science's fight against disease.

In 1976, more than 1.1 million persons were employed as engineers, the second largest professional occupation, exceeded only by teachers. Most engineers specialize in one of the more than 25 specialties recognized by professional societies. Within the major branches are over 85 minor subdivisions. Structural, environmental, hydraulic, and highway engineering, for example, are subdivisions of civil engineering. Engineers also may specialize in the engineering problems of one industry, such as motor vehicles, or in a particular field of technology, such as propulsion or guidance systems. This section, which contains an overall discussion of engineering, is followed by separate statements on 12 branches of the profession—aerospace, agricultural, biomedical, ceramic, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, and petroleum engineering.

Nature of the Work

Engineers apply the theories and principles of science and mathematics to practical technical problems. Often their work is the link between a scientific discovery and its useful application. Engineers design machinery, products, systems, and processes for efficient and economical performance. They develop electric power, water supply, and waste disposal systems to meet the problems of urban living. They design industrial machinery and equipment used to manufacture goods; and heating, air-conditioning, and ventilation equipment for more comfortable living. Engineers also develop scientific equipment to probe outer space and the ocean depths, design defense and weapons systems for the Armed Forces, and design, plan, and supervise the construction of buildings, highways, and rapid transit systems. They design and develop consumer products such as automobiles, television sets, and refrigerators, and systems for control and automation of manufacturing, business, and management processes.

Engineers must consider many factors in developing a new product. For example, in developing new devices to reduce automobile exhaust emissions, engineers must determine the general way the device will work, design and test all components, and fit them together in an integrated plan. They must then evaluate the overall effectiveness of the new device, as well as its cost and reliability. These factors apply to most products, including those as different as medical equipment, electronic computers, and industrial machinery.

In addition to design and development, many engineers work in testing, production, operation, or maintenance. They supervise the operation of production processes, determine the causes of breakdowns, and perform tests on newly manufactured products to ensure that quality standards are maintained. They also estimate the time needed to complete engineering projects and their cost. Still others are in administrative and management jobs where an engineering background is necessary, or in sales where they discuss the technical aspects of a product and assist in planning its installation or use. (See statement on manufacturers' salesworkers elsewhere in the *Handbook*.) Engineers with considerable education or experience sometimes work as consultants. Some with advanced degrees teach in the engineering schools of colleges and universities.

Engineers within each of the branches may apply their specialized knowledge to many fields. Electrical engineers, for example, work in medicine, computers, missile guidance, or electric power distribution. Because engineering problems are usually complex, the work in some fields cuts across the traditional branches. Using a team approach to solve problems, engineers in one field often work closely with specialists in other scientific, engineering, and business occupations.

Places of Employment

More than half of all engineers work in manufacturing industries—mostly in the electrical and electronic equipment, aircraft and parts, machinery, chemicals, scientific instruments, primary metals, fabricated metal products, and motor vehicle industries. Over 340,000 were employed in nonmanufacturing industries in 1976, primarily in construction, public utilities, engineering and architectural services, and business and management consulting services.

Federal, State, and local governments employed about 150,000 engineers. Over half of these worked for the Federal Government, mainly in the Departments of Defense, Interior, Agriculture, Transportation, and in the National Aeronautics and Space Administration. Most engineers in State and local government agencies worked in highway and public works departments.

Colleges and universities employed about 45,000 engineers in research and teaching jobs, and a small number worked for nonprofit research organizations.

Engineers are employed in every State, in small and large cities and in rural areas. Some branches of engineering are concentrated in particular industries and geographic areas, as discussed in the statements later in this chapter.

Training, Other Qualifications, and Advancement

A bachelor's degree in engineering is the generally accepted educational requirement for beginning engineering jobs. College graduates trained in one of the natural sciences or mathematics also may qualify for some beginning jobs. Experienced technicians with some engineering education are occasionally able to advance to some types of engineering jobs.

Many colleges recently have established 2- or 4-year programs leading to degrees in engineering technology. These programs prepare students for practical design and production work rather than for jobs that require more theoretical scientific and mathematical knowledge. Graduates of 4-year engineering technology programs may get jobs similar to those obtained by engineering bachelor's degree graduates. However, the status of those with the engineering technology degree is still not clear. Some employers regard them as having skills somewhere between those of a technician and an engineer.

Graduate training is being emphasized for an increasing number of jobs; it is essential for most beginning teaching and research positions, and is desirable for advancement. Some specialties, such as nuclear engineering, are taught mainly at the graduate level.

About 250 colleges and universities offer a bachelor's degree in engineering, and over 50 colleges offer a bachelor's degree in engineering technology. Although programs in the larger branches of engineering are offered in most of these institutions, some small specialties are taught in only a very few. Therefore, students desiring specialized training should investigate curriculums before selecting a college. Admissions requirements for undergraduate engineering schools usually include high school courses in advanced mathematics and the physical sciences.

In a typical 4-year curriculum, the first 2 years are spent studying basic sciences—mathematics, physics, chemistry, introductory engineering—and the humanities, social sciences, and English. The last 2 years are devoted, for the most part, to specialized engineering courses. Some programs offer a general engineering curriculum, permitting the student to choose a specialty in graduate school or acquire it on the job.

Some engineering curriculums require more than 4 years to complete.

A number of colleges and universities now offer 5-year master's degree programs. In addition, several engineering schools have formal arrangements with liberal arts colleges whereby a student spends 3 years in a liberal arts college studying pre-engineering subjects and 2 years in an engineering school and receives a bachelor's degree from each.

Some schools have 5- or even 6-year cooperative plans where students coordinate classroom study and practical work experience. In addition to gaining useful experience, students can finance part of their education. Because of the need to keep up with rapid advances in technology, engineers often continue their education throughout their careers.

All 50 States and the District of Columbia require licensing for engineers whose work may affect life, health, or property, or who offer their services to the public. In 1976, there were over 300,000 registered engineers. Generally, registration requirements include a degree from an accredited engineering school, 4 years of relevant work experience, and the passing of a State examination.

Engineering graduates usually begin work under the supervision of experienced engineers. Some companies have special programs to acquaint new engineers with special industrial practices and to determine the specialties for which they are best suited. Experienced engineers may advance to positions of greater responsibility and some engineers move to management or administrative positions after several years of engineering. Some engineers obtain graduate degrees in business administration to improve their advancement opportunities, while still others obtain law degrees and become patent attorneys. Many high level executives in private industry who began their careers as engineers.

Engineers should be able to work as part of a team and should have creativity, an analytical mind, and a capacity for detail. They should be able to express their ideas well orally and in writing.

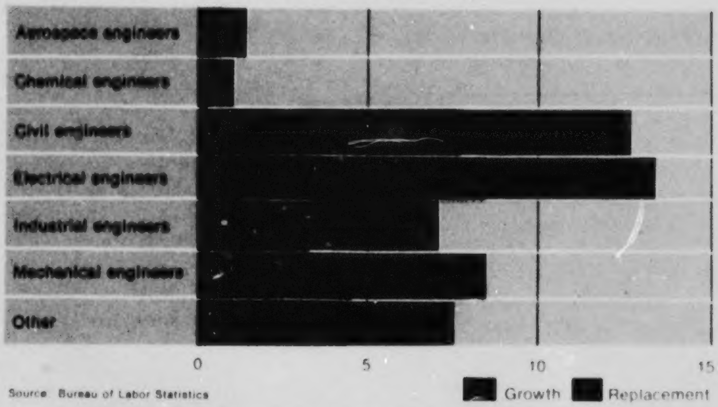
Employment Outlook

Employment opportunities for engineers are expected to be good through the mid-1980's in most specialities. In addition there may be some opportunities for college graduates from related fields in certain engineering jobs.

Employment requirements for engineers are expected to grow slightly faster than the average for all occupations through the mid-1980's. Much of this growth will stem from industrial expansion to meet the demand for more goods and services. More engineers will be needed in the design and construction of factories, utility systems, office buildings, and transportation systems, as well as in the development and manufacture of defense-related products, scientific instruments, industrial machinery, chemical products, and motor vehicles.

Growth and replacement needs are expected to provide many job openings for engineers

Selected engineering occupations
Average annual openings, 1976-85 (in thousands)



Source: Bureau of Labor Statistics

Engineers will be required in energy-related activities developing sources of energy as well as designing energy-saving systems for automobiles, homes, and other buildings. Engineers also will be needed to solve environmental problems.

The level of expenditures in some of these areas, particularly defense, however, has fluctuated in the past, affecting the requirements for engineers, and may do so in the future. The outlook for engineers given here is based on the assumption that defense spending will increase from its 1976 level but will still be lower than the peak levels of the 1960's. If, however, defense activity is higher or lower than the level assumed, the demand for engineers will be higher or lower than now expected. Further, if the demand for their specialty declines, engineers may lose their jobs. This can be a particular problem for older engineers, who may face difficulties in finding other engineering jobs. These difficulties can be minimized by selection of a career in one of the more stable industries and engineering specialties, and by continuing-education to keep up on the latest technological developments.

Despite these problems, over the long run the number of people seeking jobs as engineers is expected to be in balance with the number of job openings.

(The outlook for various branches is discussed in the separate statements later in this section.)

Earnings and Working Conditions

According to the College Placement Council, engineering graduates with a bachelor's degree and no experience were offered average starting salaries of $14,800 a year in private industry in 1976; those with a master's degree and no experience, almost $16,500 a year; and those with a Ph. D., over $21,000. Starting offers for those with the bachelor's degree vary by branch as shown in the accompanying table.

Starting salaries for engineers, by branch, 1976

Branch	Average starting salaries
Aeronautical engineering	$14,268
Chemical engineering	16,212
Civil engineering	13,764
Electrical engineering	14,448
Industrial engineering	14,568
Mechanical engineering	14,964
Metallurgical engineering	15,600

In the Federal Government in 1977, engineers with a bachelor's degree and no experience could start at $9,303 or $11,523 a year, depending on their college records. Those with a master's degree could start at $11,523 or $14,097. Those having a Ph. D. degree could begin at $17,056 or $20,442. The average salary for experienced engineers in the Federal Government was about $25,900 in 1977.

For a 9-month academic college year in 1976, faculty members with 5 years' experience beyond the bachelor's degree received about $15,150; those with 18 to 20 years experience beyond the bachelor's degree received about $21,150. (See statement on college and university teachers elsewhere in the *Handbook*.)

Engineers can expect an increase in earnings as they gain experience. According to an Engineering Manpower Commission survey, the average salary for engineers with 20 years of experience was $26,000 in 1976. Some in management positions had much higher earnings.

Many engineers work indoors in offices and research laboratories. Others, however, spend time in more active work—in a factory or mine, at a construction site, or some other outdoor location.

Sources of Additional Information

General information on engineering careers—including engineering school requirements, courses of study, and salaries—is available from:

Engineers' Council for Professional Development, 345 E. 47th St., New York, N.Y. 10017.

Engineering Manpower Commission of Engineers Joint Council, 345 E. 47th St., New York, N.Y. 10017.

National Society of Professional Engineers, 2029 K St. NW., Washington, D.C. 20006.

For information about graduate study, contact:

American Society for Engineering Education, One Dupont Circle, Suite 400, Washington, D.C. 20036.

Societies representing the individual branches of the engineering profession are listed later in this chapter. Each can provide information about careers in the particular branch. Many other engineering organizations are listed in the following publications available in most libraries or from the publisher:

Directory of Engineering Societies, published by Engineers Joint Council, 345 E. 47th St., New York, N.Y. 10017.

Scientific and Technical Societies of the United States and Canada, published by the National Academy of Sciences, National Research Council, 2101 Constitution Ave., NW., Washington, D.C. 20418.

Some engineers are members of labor unions. Information on engineering unions is available from:

International Federation of Professional and Technical Engineers, 1126 16th St. NW., Washington, D.C. 20036.

AEROSPACE ENGINEERS

(D.O.T. 002.081)

Nature of the Work

Aerospace engineers design, develop, test, and help produce commercial and military aircraft, missiles, and spacecraft. They play an

Aerospace engineer checking out part of a spacecraft.

important role in advancing the state of technology in commercial aviation, defense systems, and space exploration.

Aerospace engineers often specialize in an area of work like structural design, navigational guidance and control, instrumentation and communication, or production methods. They also may specialize in one type of aerospace product such as passenger planes, helicopters, satellites, or rockets.

Places of Employment

About 50,000 aerospace engineers were employed in 1976, mainly in the aircraft and parts industry. Some worked for Federal Government agencies, primarily the National Aeronautics and Space Administration and the Department of Defense. A few worked for commercial airlines, consulting firms, and colleges and universities.

Employment Outlook

Employment of aerospace engineers is expected to grow more slowly than the average for all occupations through the mid-1980's. Employment of aerospace engineers is largely determined by the level of Federal expenditures on defense and space programs: in the past, rapid changes in spending levels have usually been accompanied by sharp employment fluctuations. Expenditures for the space program are expected to increase only slightly from 1976 to the mid-1980's, while defense spending will probably increase moderately. Although few jobs will be created by employment growth, many workers will be required to fill openings created by deaths, retirements, and transfers of workers to other occupations. (See introductory section of this chapter for discussion of training requirements and earnings. See also statement on aircraft, missile, and spacecraft manufacturing elsewhere in the *Handbook*.)

Sources of Additional Information

American Institute of Aeronautics and Astronautics, Inc., 1290 Avenue of the Americas, New York, N.Y. 10019.

AGRICULTURAL ENGINEERS

(D.O.T. 013.081)

Nature of the Work

Agricultural engineers design machinery and equipment, and develop methods to improve efficiency in the production, processing, and distribution of food and other agricultural products. They also are concerned with the conservation and management of energy, soil, and water resources. Agricultural engineers work in research and development, production, sales, or management.

Places of Employment

Most of the 12,000 agricultural engineers employed in 1976 worked for manufacturers of farm equipment, electric utility companies, and distributors of farm equipment and supplies. Some worked for engineering consultants who supply services to farmers and farm-related industries; others were independent consultants.

About 450 agricultural engineers are employed in the Federal Government, mostly in the Department of Agriculture; some are employed in colleges and universitites; and a few work in State and local governments.

Employment Outlook

Employment of agricultural engineers is expected to grow faster than the average for all occupations through the mid-1980's. Increasing demand for agricultural products, modernization of farm operations, increasing emphasis on conservation of resources, and the use of agricultural products and wastes as industrial raw materials should provide additional opportunities for engineers. (See introductory part of this section for information on training requirements and earnings. See also statement on agriculture elsewhere in the *Handbook*.)

Sources of Additional Information

American Society of Agricultural Engineers, 2950 Niles Rd., St. Joseph, Mich. 49085.

BIOMEDICAL ENGINEERS

Nature of the Work

Biomedical engineers use engineering principles to solve medical and health-related problems. Many do research, along with life scientists, chemists, and members of the medical profession, on the engineering as-

Many biomedical engineers are involved in research.

pects of the biological systems of man and animals. Some design and develop medical instruments and devices including artificial hearts and kidneys, lasers for surgery, and pacemakers that regulate the heartbeat. Other biomedical engineers adapt computers to medical science, and design and build systems to modernize laboratory, hospital, and clinical procedures. Most engineers in this field require a sound background in one of the major engineering disciplines (mechanical, electrical, industrial, or chemical) in addition to specialized biomedical training.

Places of Employment

There were about 3,000 biomedical engineers in 1976. Most teach and do research in colleges and universities. Some work for the Federal Government, primarily in the National Aeronautics and Space Administration, or in State agencies. An increasing number work in private industry developing new devices, techniques, and systems for improving health care. Some work in sales positions.

Employment Outlook

Employment of biomedical engineers is expected to grow faster than the average for all occupations through the mid-1980's, but the actual number of openings is not likely to be very large. Those who have advanced degrees will be in demand to teach and to fill jobs resulting from increased expenditures for medical research. Increased research funds could also create new positions in instrumentation and systems for the delivery of health services. (See introductory part of this chapter for information on training requirements and earnings.)

Sources of Additional Information

Alliance for Engineering in Medicine and Biology, Suite 404, 4405 East-West Highway, Bethesda, Md. 20014.

Biomedical Engineering Society, P.O. Box 2399, Culver City, Calif. 90230.

CERAMIC ENGINEERS

(D.O.T. 006.081)

Nature of the Work

Ceramic engineers develop new ceramic materials and methods for making ceramic materials into useful products. Although to some, the word ceramics means pottery, ceramics actually include all nonmetallic, inorganic materials which require the use of high temperature in their processing. Thus, ceramic engineers work on diverse products such as glassware, heat-resistant materials for furnaces, electronic components, and nuclear reactors. They also design and supervise the construction of plants and equipment to manufacture these products.

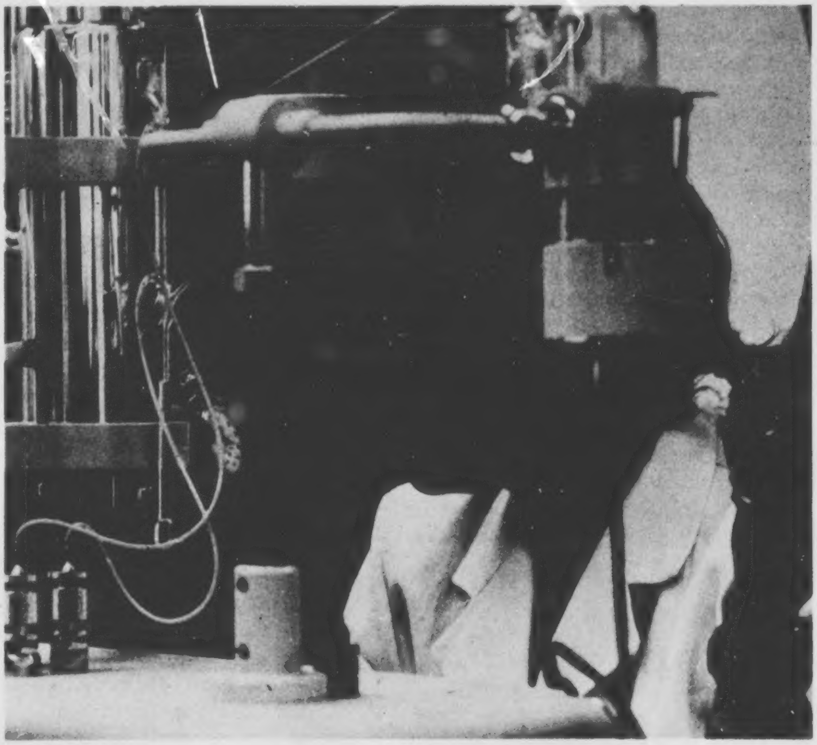
Ceramic engineers generally specialize in one product or more—for example, products of refractories (fire-and heat-resistant materials such as firebrick); whitewares (porcelain and china dinnerware or high voltage electrical insulators); structural materials (such as brick, tile and terra cotta); electronic ceramics (ferrites for memory systems and microwave devices); protective and refractory coatings for metals; glass; abrasives; cement technology; or fuel elements for atomic energy.

Places of Employment

About 12,000 ceramic engineers were employed in 1976, mostly in the stone, clay, and glass industry. Others work in industries that produce or use ceramic products such as the iron and steel, electrical equipment, aerospace, and chemicals industries. Some are in colleges and universities, independent research organizations, and the Federal Government.

Employment Outlook

Employment of ceramic engineers is expected to grow faster than the average for all occupations through the mid-1980's. Programs related to nuclear energy, electronics, defense, and medical science will provide job opportunities for ceramic engineers.



Most ceramic engineers are employed in the stone, clay, and glass industry.

Additional ceramic engineers will be required to improve and adapt traditional ceramic products, such as whitewares and abrasives, to new uses. The development of filters and catalytic surfaces to reduce pollution, and the development of ceramic materials for energy conversion and conservation, should create additional openings for ceramic engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Ceramic Society, 65 Ceramic Dr.,
Columbus, Ohio 43214.

CHEMICAL ENGINEERS

(D.O.T. 008.081)

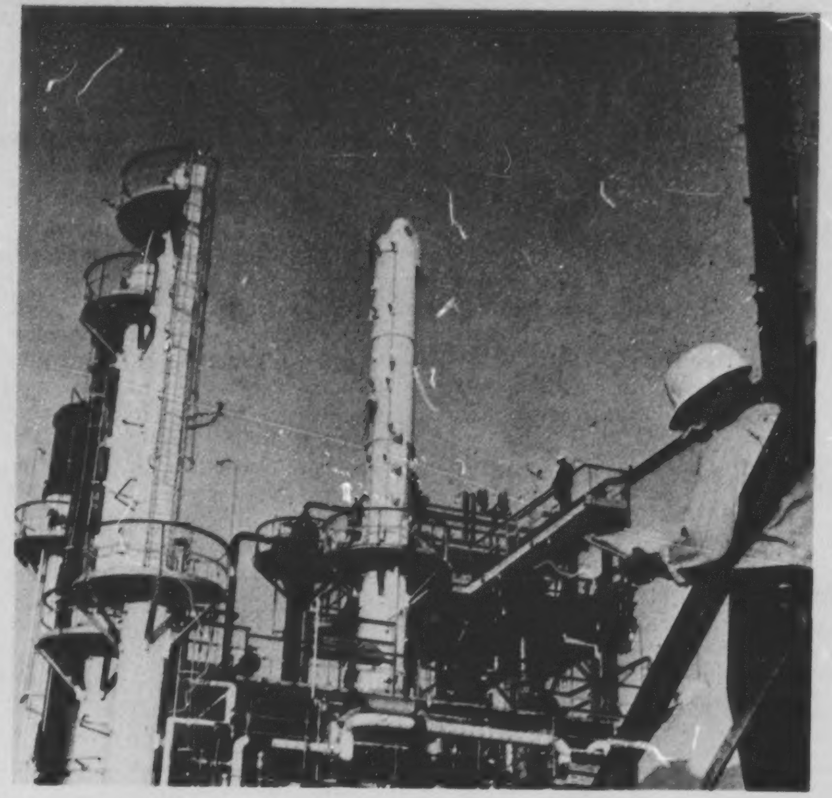
Nature of the Work

Chemical engineers are involved in many phases of the production of chemicals and chemical products. They design equipment and chemical plants as well as determine methods of manufacturing the product. Often, they design and operate pilot plants to test their work and develop chemical processes such as those to remove chemical contaminants from waste materials. Because the duties of chemical engineers cut across many fields, these professionals must have a working knowledge of chemistry, physics, and mechanical and electrical engineering.

This branch of engineering is so diversified and complex that chemical engineers frequently specialize in a particular operation such as oxidation or polymerization. Others specialize in a particular area such as pollution control or in the production of a specific product like plastics or rubber.

Places of Employment

Most of the 50,000 chemical engineers working in 1976 were in manufacturing industries, primarily those producing chemicals, petroleum, and related products. Some worked in government agencies or taught and did research in colleges and universities. A small number worked for independent research institutes and engineering consulting firms, or as independent consulting engineers.



Chemical engineer checks production instructions at chemical plant.

Employment Outlook

Employment of chemical engineers is expected to grow about as fast as the average for all occupations through the mid-1980's. A major factor underlying this growth is industry expansion—the chemicals industry in particular.

The growing complexity and automation of chemical processes will require additional chemical engineers to design, build, and maintain the necessary plants and equipment. Chemical engineers also will be needed to solve problems dealing with environmental protection, development of synthetic fuels, and the design and development of nuclear reactors. In addition, development of new chemicals used in the manufacture of consumer goods, such as plastics and synthetic fibers, probably will create additional openings. (See introductory part of this section for information on training requirements and earnings. See also the statement on chemists and the industrial chemical industry elsewhere in the *Handbook.*)

Sources of Additional Information

American Institute of Chemical Engineers,
345 East 47th St., New York, N.Y.
10017.

CIVIL ENGINEERS

(D.O.T. 005.081)

Nature of the Work

Civil engineers, who work in the oldest branch of the engineering profession, design and supervise the con-

Most civil engineers work for construction companies and Federal, State, and local governments.

struction of roads, harbors, airports, tunnels, bridges, water supply and sewage systems, and buildings. Major specialties within civil engineering are structural, hydraulic, environmental (sanitary), transportation (including highways and railways), geotechnical, and soil mechanics.

Many civil engineers are in supervisory or administrative positions ranging from supervisor of a construction site to city engineer to top-level executive. Others teach in colleges and universities or work as consultants.

Places of Employment

About 155,000 civil engineers were employed in 1976. Most work for Federal, State, and local government agencies or in the construction industry. Many work for consulting engineering and architectural firms or as independent consulting engineers. Others work for public utilities, railroads, educational institutions, and manufacturing industries.

Civil engineers work in all parts of the country, usually in or near major industrial and commercial centers. They often work at construction sites, sometimes in remote areas or in foreign countries. In some jobs, they must often move from place to place to work on different projects.

Employment Outlook

Employment of civil engineers is expected to increase about as fast as the average for all occupations through the mid-1980's. Job opportunities will result from the growing needs for housing, industrial buildings, electric power generating plants, and transportation systems created by a growing population and an expanding economy. Work related to solving problems of environmental pollution and energy self-sufficiency will also require additional civil engineers.

Many civil engineers also will be needed each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017.

ELECTRICAL ENGINEERS

(D.O.T. 003.081, .151, and .187)

Nature of the Work

Electrical engineers design, develop, test, and supervise the manufacture of electrical and electronic equipment. Electric equipment includes power generating and transmission equipment used by electric motors, machinery controls, and lighting and wiring in buildings, and in automobiles and aircraft. Electronic equipment includes radar, computers, communications equipment, missile guidance systems, and consumer goods such as televisions and stereos.

Electrical engineers generally specialize in a major area—such as integrated circuits, computers, electrical equipment manufacturing, communications, or power distributing equipment—or in a subdivision of these areas—microwave communication or aviation electronic systems, for example. Electrical engineers design new products and specify their uses and write performance requirements and maintenance schedules. They also test equipment, solve operating problems, and estimate the time and cost of engineering projects. Besides employment in research, development, and design, many are in manufacturing, administration and management, technical sales, or college teaching.

Places of Employment

Electrical engineering is the largest branch of the profession. About 300,000 electrical engineers were employed in 1976, mainly by manufacturers of electrical and electronic equipment, aircraft and parts, business machines, and professional and scientific equipment. Many work for telephone, telegraph, and electric light and power companies. Large numbers are employed by government agencies and by colleges and universities. Others work for construction firms, for engineering consultants, or as independent consulting engineers.

Employment Outlook

Employment of electrical engineers is expected to increase about as fast as average for all occupations through the mid-1980's. Although increased demand for computers, communications, and military electronics is expected to be the major contributor to this growth, demand for electrical and electronic consumer goods, along with increased research and development in new types of power generation, should create additional jobs. Many electrical engineers also will be needed to replace personnel who retire, die, or transfer to other fields of work.

The long-range outlook for electrical engineers is based on the assumption that defense spending in the mid-1980's will increase from the 1976 level, but will still be somewhat lower than the peak level of the late 1960's. If defense activity is higher or lower than the projected level, the demand for electrical engineers will be higher or lower than now expected.

(See introductory part of this section for information on training requirements and earnings. See also statement on electronics manufacturing elsewhere in the *Handbook*.)

Sources of Additional Information

Institute of Electrical and Electronic Engineers/United States Activities Board, 2029 K St., N.W., Washington, D.C. 20006.

Electrical engineer developing specialized electrical equipment.

INDUSTRIAL ENGINEERS

(D.O.T. 012.081, .168, and .188)

Nature of the Work

Industrial engineers determine the most effective ways for an organization to use the basic factors of production—people, machines, and materials. They are more concerned with people and methods of business organization than are engineers in other specialties who generally are concerned more with particular products or processes, such as metals, power, or mechanics.

To solve organizational, production, and related problems most efficiently, industrial engineers design data processing systems and apply mathematical concepts (operations research techniques). They also develop management control systems to aid in financial planning and cost analysis, design production planning

Industrial engineer reviewing film of production process to check for problems.

and control systems to coordinate activities and control product quality, and design or improve systems for the physical distribution of goods and services. Industrial engineers also conduct plant location surveys, where they look for the best combination of sources of raw materials, transportation, and taxes, and develop wage and salary administration systems and job evaluation programs. Because the work is closely related, many industrial engineers move into management positions.

Places of Employment

About 200,000 industrial engineers were employed in 1976; more than two-thirds worked in manufacturing industries. Because their skills can be used in almost any type of company, they are more widely distributed among industries than are those in other branches of engineering. For example, some work for insurance companies, banks, construction and mining firms, and public utilities. Hospitals, retail organizations, and other large business firms employ industrial engineers to improve operating efficiency. Still others work for government agencies and colleges and universities. A few are independent consulting engineers.

Employment Outlook

Employment of industrial engineers is expected to grow faster than the average for all occupations through the mid-1980's. The increasing complexity of industrial operations and the expansion of automated processes, along with industry growth, are factors contributing to employment growth. Increased recognition of the importance of scientific management and safety engineering in reducing costs and increasing productivity, and the need to solve environmental problems, should create additional opportunities.

Additional numbers of industrial engineers will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

American Institute of Industrial Engineers, Inc., 25 Technology Park/Atlanta, Norcross, Ga. 30092.

MECHANICAL ENGINEERS

(D.O.T. 007.081, .151, .168, and .187)

Nature of the Work

Mechanical engineers are concerned with the production, transmission, and use of power. They design and develop power-producing machines such as internal combustion engines, steam and gas turbines, and jet and rocket engines. They also design and develop power-using machines such as refrigeration and air-conditioning equipment, elevators, machine tools, printing presses, and steel rolling mills.

The work of mechanical engineers varies by industry and function since many specialties have developed within the field. Specialties included are motor vehicles, marine equipment, energy conversion systems, heating, ventilating and air-conditioning, instrumentation, and machines for specialized industries, such as petroleum, rubber and plastics, and construction.

Large numbers of mechanical engineers do research, test, and design work. Many are administrators or managers, while others work in maintenance, technical sales, and production operations. Some teach in colleges and universities or work as consultants.

Places of Employment

About 200,000 mechanical engineers were employed in 1976. Almost three-fourths were employed in manufacturing—mainly in the primary and fabricated metals, machinery, transportation equipment, and electrical equipment industries. Others worked for government agencies, educational institutions, and consulting engineering firms.

Employment Outlook

Employment of mechanical engineers is expected to increase about as fast as the average for all occupations through the mid-1980's. The growing demand for industrial machinery and machine tools and the increasing complexity of industrial machinery and processes will be major factors supporting increased employment opportunities. Mechanical engineers will be needed to develop new energy systems and to help solve environmental pollution problems.

Large numbers of mechanical engineers also will be required each year to replace those who retire, die, or transfer to other occupations. (See introductory part of this section for information on training requirements and earnings. See also statement on occupations in the atomic energy field elsewhere in the *Handbook.*)

Sources of Additional Information

The American Society of Mechanical Engineers, 345 E. 47th St., New York, N.Y. 10017.

METALLURGICAL ENGINEERS

(D.O.T. 011.081)

Nature of the Work

Metallurgical engineers develop methods to process and convert metals into useful products. Most of these engineers generally work in one of the three main branches of metallurgy—extractive or chemical, physical, and mechanical. Extractive metallurgists are concerned with extracting metals from ores, and refining and alloying them to obtain useful metal. Physical metallurgists deal with the nature, structure, and physical properties of metals and their alloys, and with methods of converting refined metals into final products. Mechanical metallurgists develop methods to work and shape metals such as casting, forging, rolling, and drawing. Scientists working in this field are known as metallurgists or materials scientists, but the distinction between scientists and engineers in this field is small.

Metallurgical engineers study the physical properties of metal.

Places of Employment

The metalworking industries—primarily the iron and steel and nonferrous metals industries—employed over one-half of the estimated 17,000 metallurgical and materials engineers in 1976. Metallurgical engineers also work in industries that manufacture machinery, electrical equipment, and aircraft and parts, and in the mining industry. Some work for government agencies and colleges and universities.

Employment Outlook

Employment of metallurgical and materials engineers is expected to grow faster than the average for all occupations through the mid-1980's. An increasing number of these engineers will be needed by the metalworking industries to develop new metals and alloys as well as to adapt current ones to new needs. For example, communications equipment, computers, and spacecraft require lightweight metals of high purity. As the supply of high-grade ores diminishes, more metallurgical engineers will be required to develop new ways of recycling solid waste materials in addition to processing low-grade ores now regarded as unprofitable to mine. Metallurgical engineers also will be needed to solve problems associated with the efficient use of nuclear energy. (See introductory part of this section for information on training requirements and earnings. Also see statement on the iron and steel industry elsewhere in the *Handbook.*)

Sources of Additional Information

The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers, 345 E. 47th St., New York, N.Y. 10017.

American Society for Metals, Metals Park, Ohio 44073.

MINING ENGINEERS

(D.O.T. 010.081 and .187)

Nature of the Work

Mining engineers find, extract, and prepare minerals for manufacturing industries to use. They design the layouts of open pit and underground mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants. Mining engineers are responsible for the economic and efficient operation of mines and mine safety, including ventilation, water supply, power, communications, and equipment maintenance. Some mining engineers work with geologists and metallurgical engineers to locate and appraise new ore deposits. Others develop new mining equipment or direct mineral processing operations, which involve separating minerals from the dirt, rocks, and other materials they are mixed with. Mining engineers frequently specialize in the mining of one specific mineral such as coal or copper.

With increased emphasis on protecting the environment, many mining engineers have been working to solve problems related to mined-land reclamation and water and air pollution.

Places of Employment

About 6,000 mining engineers were employed in 1976. Most work in the mining industry. Some work for firms that produce equipment for the mining industry, while others work in colleges and universities, in government agencies, or as independent consultants.

Mining engineers are responsible for the efficient operation of mines and mine safety.

Mining engineers are usually employed at the location of mineral deposits, often near small communities. However, those in research, teaching, management, consulting, or sales often are located in large metropolitan areas.

Employment Outlook

Employment of mining engineers is expected to increase faster than the average for all occupations through the mid-1980's. Efforts to attain energy self-sufficiency should spur the demand for coal, and therefore for mining engineers in the coal industry. The increase in demand for coal will depend, to a great extent, on the availability and price of other domestic energy sources such as petroleum, natural gas, and nuclear energy. More technologically advanced mining systems and further enforcement of mine health and safety regulations also will increase the need for mining engineers. In addition, exploration for all other minerals is also increasing. Easily mined deposits are being depleted, creating a need for engineers to devise more efficient methods for mining low-grade ores. Employment opportunities also will arise as new alloys and new uses for metals increase the demand for less widely used ores. Recovery of metals from the sea and the development of oil shale deposits could present major challenges to the mining engineer. (See introductory part of this section for information on training requirements and earnings. See also statement on mining elsewhere in the *Handbook*.)

Sources of Additional Information

The Society of Mining Engineers of the American Institute of Mining, Metallurgical, and Petroleum Engineers, 540 Arapeen Dr.—Research Park, Salt Lake City, Utah 84108.

PETROLEUM ENGINEERS

(D.O.T. 010.081)

Nature of the Work

Petroleum engineers are mainly involved in exploring and drilling for and producing oil and gas. They work to achieve the maximum profitable recovery of oil and gas from a petroleum reservoir by determining and developing the best and most efficient production methods.

Since only a small proportion of the oil and gas in a reservoir will flow out under natural forces, petroleum engineers develop and use various artificial recovery methods such as flooding the oil field with water to force the oil to the surface. Even when using the best recovery methods, about half the oil is still left in the ground. Petroleum engineers' research and development efforts to increase the proportion of oil recovered in each reservoir can make a significant contribution to increasing available energy resources.

Petroleum engineers discuss problem with drilling supervisor.

Places of Employment

About 20,000 petroleum engineers were employed in 1976, mostly in the petroleum industry and closely allied fields. Their employers include not only the major oil companies, but also the hundreds of smaller independent oil exploration and production companies. They also work for companies that produce drilling equipment and supplies. Some petroleum engineers work in banks and other financial institutions which need their knowledge of the economic value of oil and gas properties. A small number work for engineering consulting firms or as independent consulting engineers, and for the Federal and State governments.

The petroleum engineer's work is concentrated in places where oil and gas are found. Almost three-fourths of all petroleum engineers are employed in the oil-producing States of Texas, Oklahoma, Louisiana, and California. There are many American petroleum engineers working overseas in oil-producing countries.

Employment Outlook

The employment of petroleum engineers is expected to grow faster than the average for all occupations through the mid-1980's. Economic expansion will require increasing supplies of petroleum and natural gas, even with energy conservation measures. With efforts to attain energy self-sufficiency, and high petroleum prices, increasingly sophisticated and expensive recovery methods will be used. Also, new sources of oil such as oil shale and new offshore oil sources may be developed. All of these factors will contribute to increasing demand for petroleum engineers. (See introductory part of this section for information on training requirements and earnings.)

Sources of Additional Information

Society of Petroleum Engineers of AIME, 6200 North Central Expressway, Dallas, Tex. 75206.

FBI SPECIAL AGENTS

(D.O.T. 375.168)

Nature of the Work

Federal Bureau of Investigation (FBI) special agents investigate violations of Federal laws in connection with bank robberies, kidnappings, white-collar crime, thefts of Government property, organized crime, espionage, and sabotage. The FBI, which is part of the U.S. Department of Justice, has jurisdiction over many different Federal investigative matters. Special agents, therefore, may be assigned to any type of case, although those with specialized training usually work on cases related to their background. Agents with an accounting background, for example, may investigate white-collar crimes such as bank embezzlements, or fraudulent bankruptcies or land deals.

Because the FBI is a fact-gathering agency, its special agents function strictly as investigators, collecting evidence in cases in which the U.S. Government is or may be an interested party. In their casework, special agents conduct interviews, examine records, observe the activities of suspects, and participate in raids. Because the FBI's work is highly confidential, special agents may not disclose any of the information gathered in the course of their official duties to unauthorized persons, including members of their families. Frequently agents must testify in court about cases that they investigate.

Although they work alone on most assignments, agents communicate with their supervisors by radio or telephone as the circumstances dictate. In performing potentially dangerous duties, such as arrests and raids, two agents or more are assigned to work together.

Places of Employment

About 8,600 persons were special agents in 1976. Most agents were assigned to the FBI's 59 field offices located throughout the Nation and in Puerto Rico. They worked in cities where field office headquarters are located or in resident agencies (suboffices) established under field office supervision to provide prompt and efficient handling of investigative matters arising throughout the field office territory. Some agents are assigned to the Bureau headquarters in Washington, D.C., which supervises all FBI activities.

Special agents process a car for fingerprints.

Training, Other Qualifications, and Advancement

To be considered for appointment as an FBI special agent, an applicant usually must be a graduate of a State-accredited law school or a college graduate with a major in accounting. The law school training must have been preceded by at least 2 years of undergraduate college work.

From time to time, as the need arises, the FBI accepts applications from persons who have a 4-year college degree with a physical science major or fluency in a foreign language, or who have 3 years of professional, executive, complex investigative, or other specialized experience.

Applicants for the position of FBI special agent must be citizens of the United States, be at least 23 years old but not have reached their 35th birthday before they begin duty and be willing to serve anywhere in the United States or Puerto Rico. They must be capable of strenuous physical exertion, and have excellent hearing and vision, normal color perception, and no physical defects that would prevent their using firearms or participating in dangerous assignments. All applicants must pass a rigid physical examination, as well as written and oral examinations testing their aptitude for meeting the public and conducting investigations. All of the tests except the physical examinations are given by the FBI at its facilities. Background and character investigations are made of all applicants. Appointments are made on a probationary basis and become permanent after 1 year of satisfactory service.

Each newly appointed special agent is given about 15 weeks of training at the FBI Academy at the U.S. Marine Corps Base in Quantico, Va. before assignment to a field office. During this period, agents receive intensive training in defensive tactics and the use of firearms. In addition, they are thoroughly schooled in Federal criminal law and procedures, FBI rules and regulations, fingerprinting, and investigative work. After assignment to a field office, the new agent usually works closely with an experienced agent for about 2 weeks before handling any assignments independently.

All administrative and supervisory jobs are filled from within the ranks by selecting those FBI special agents who have demonstrated the ability to assume more responsibility.

Employment Outlook

The jurisdiction of the FBI has expanded greatly over the years. Although it is impossible to forecast special agent personnel requirements, employment may be expected to increase with growing FBI responsibilities.

The FBI provides a career service and its rate of turnover is traditionally low. Nevertheless, the FBI is always interested in applications from qualified persons who would like to be considered for the position of special agent.

Earnings and Working Conditions

The entrance salary for FBI special agents was $15,524 in late 1976. Special agents are not appointed under Federal Civil Service regulations, but, like other Federal employees, they receive periodic within-grade salary raises if their work performance is satisfactory; they can advance in grade as they gain experience. Salaries of supervisory agents start at $28,725 a year.

Special agents are subject to call 24 hours a day and must be available for assignment at all times. Their duties call for some travel, for they are assigned wherever they are needed in the United States or Puerto Rico. They frequently work longer than the customary 40-hour week and, under specified conditions, receive overtime pay up to about $3,900 a year. They are granted paid vacations, sick leave, and annuities on retirement. Agents are required to retire at age 55 if they have served at least 20 years.

Sources of Additional Information

The Federal Bureau of Investigation, U.S. Department of Justice, Washington, D.C. 20535.

FLIGHT ATTENDANTS

(D.O.T. 352.878)

Nature of the Work

Flight attendants (also called stewardesses and stewards) are aboard almost all commercial passenger planes to help make the passengers' flight safe, comfortable, and enjoyable.

Before each flight, attendants see that the passenger cabin is in order. They check that supplies such as food, beverages, blankets, and reading material are adequate, and that first aid kits and other emergency equipment are aboard. As passengers come aboard, attendants greet them, check their tickets, and assist them by hanging up coats and stowing small pieces of luggage under the seats.

Before the plane takes off, attendants use the public address system to instruct passengers in the use of emergency equipment and check to see that all passengers have their seat belts fastened. In the air, they answer questions about the flight, distribute magazines and pillows, and help care for small children, elderly persons, and handicapped persons. On many flights, they serve cocktails and precooked meals.

One of the most important functions of attendants is to assist passengers in the rare event of an emergency. These range from a disabled engine, where passengers must be reassured, to emergency landings, where attendants evacuate the plane, opening doors and inflating emergency slides. Attendants also must be prepared to administer first aid to passengers who become ill during the flight.

Places of Employment

About 42,000 flight attendants worked for the airlines in 1976. Most attendants are stationed in major cities at the airlines' main bases; nearly three-fifths work near Chicago, Dallas, Los Angeles, Miami, New York, and San Francisco. Airliners generally carry 1 to 10 flight attendants, depending on the number of seats on the plane and the proportion of economy to first-class passengers. Large aircraft like the Boeing 747 may have as many as 16 flight attendants.

Most airlines provide a 5-week training course for newly hired attendants.

Training, Other Qualifications, and Advancement

The airlines place great stress on the hiring of poised, tactful, and resourceful people. In particular, applicants should be able to talk comfortably with strangers. As a rule, applicants must be at least 19 years old. They must be in excellent health and have good vision. Vision may be corrected with contact lenses or, on most airlines, with glasses. Applicants also must speak clearly.

Applicants must be high school graduates. Those having 2 years of college, nurses' training, or experience in dealing with the public are preferred. Flight attendants for international airlines generally must be able to speak an appropriate foreign language fluently.

Most large airlines give newly hired flight attendants about 5 weeks of training in their own schools. Transportation to the training centers and an allowance while in training may be provided. Trainees are taught how to react to emergencies, including instruction on evacuating an airplane, operating an oxygen system, and giving first aid. Attendants also are taught flight regulations and duties, and company operations and policies. Additional courses in passport and customs regulations are given to trainees for the international routes. Towards the end of their training, students go on practice flights. The few airlines that do not operate schools generally send new employees to the school of another airline.

After completing their training, flight attendants are assigned to one of their airline's main bases. New attendants usually fill in on extra flights or replace attendants who are sick or on vacation. Because assignments are based on seniority, experienced attendants usually get their choice of base and flights.

Opportunities for advancement are limited. However, some attendants may advance to flight service instructor, customer service director, instructor, or recruiting representative.

Employment Outlook

Employment of flight attendants is expected to grow much faster than the average for all occupations through the mid-1980's. In addition to growth, openings will occur because of the need to replace experienced attendants who retire, die, or transfer to other occupations.

Increases in population and income are expected to increase the number of airline passengers. To deal with this growth, airlines usually enlarge their capacity by increasing the number and size of planes in operation. Since the Federal Aviation Administration safety rules require one attendant for every 50 seats, more flight attendants will be needed. Job opportunities may vary from year to year, however, because air travel is sensitive to ups and downs in the economy.

Because the job is attractive and offers a chance to travel, many people are interested in becoming flight attendants. Applicants can expect keen competition for any available jobs because the number of applicants is expected to exceed the number of openings. Applicants with 2 years of college and experience in dealing with the public have the best chance of being hired.

Earnings and Working Conditions

The average monthly earnings of all flight attendants were $1,042 in 1976. According to a number of union contracts, salaries of most beginning flight attendants on domestic flights ranged from $690 to $780 a month, while those on international flights earned from $830 to $980. As an additional benefit, flight attendants and their immediate families are entitled to reduced fare transportation on their own and most other airlines.

Since airlines operate around the clock 365 days a year, attendants may work at night, on holidays, and on weekends. They usually fly no more than 80 hours a month, but they may devote up to 35 hours a month on the ground duties involved in preparing their planes for flights. As a result of variations in scheduling and limitations on flying time, many attendants have 15 days or more off each month. Attendants may be away from their home bases about one-third of the time or more. When they are away from home, the airlines provide hotel accommodations and an allowance for meal expenses.

Flight attendants have the opportunity to meet interesting people and see new places. The combination of free time and discount air fares provides substantial opportunity for travel. However, the work can be strenuous and trying. Many short flights require speedy service if all passengers are to be served. Poor weather can make it difficult to serve drinks and meals. Attendants stand during much of the flight and must remain pleasant and efficient regardless of how tired they may be.

Most flight attendants are members of either the Transport Workers Union of America or the Association of Flight Attendants.

Sources of Additional Information

Information about job opportunities in a particular airline and the qualifications required may be obtained by writing to the personnel manager of the company. Addresses of companies are available from:

Air Transport Association of America, 1709 New York Ave. NW., Washington, D.C. 20006.

FOOD SCIENTISTS

(D.O.T. 022.081, 040.081, and 041.081)

Nature of the Work

In the past, consumers processed most food in the home, but today industry processes almost all foods. A key worker involved in the development and processing of the large variety of foods available today is the *food scientist* or *food technologist*.

Food scientists investigate the chemical, physical, and biological nature of food and apply this knowledge to processing, preserving, packaging, distributing, and storing an adequate, nutritious, wholesome, and economical food supply. About three-fifths of all scientists in food processing work in research and development. Others work in quality assurance laboratories or in production or processing areas of food plants. Some teach or do basic research in colleges and universities.

Food scientists in basic research study the structure and composition of food and the changes it undergoes in storage and processing. For example, they may develop new sources of proteins, study the effects of processing on microorganisms, or search for factors that affect the flavor, texture, or appearance of foods. Food scientists who work in applied research and development create new foods and develop new processing methods. They also seek to improve existing foods by making them more nutritious and enhancing their flavor, color, and texture.

Food scientists insure that each product will retain its characteristics and nutritive value during storage. They also conduct chemical and microbiological tests to see that products meet industry and government standards, and they may determine the nutritive contents of products in order to comply with Federal nutritional labeling requirements.

Food scientists conduct tests to identify bacterial cultures.

In quality control laboratories, food scientists check raw ingredients for freshness, maturity, or suitability for processing. They may use machines that test for tenderness by finding the amount of force necessary to puncture the item. Periodically, they inspect processing line operations to insure conformance with government and industry standards. For example, scientists test processed foods for sugar, starch, protein, fat, vitamin, and mineral content. They make sure that, after processing, various enzymes are inactive and microbial levels are adequately low so that the food will not spoil during storage or present a safety hazard. Other food scientists are involved in developing and improving packaging and storage methods.

Food scientists in production prepare production specifications, schedule processing operations, maintain proper temperature and humidity in storage areas, and supervise sanitation operations, including the efficient and economical disposal of wastes. To increase efficiency, they advise management on the purchase of equipment and recommend new sources of materials.

Some food scientists apply their knowledge in areas such as market research, advertising, and technical sales. Others teach in colleges and universities.

Places of Employment

About 7,000 persons worked as food scientists in 1976. Food scientists work in all sectors of the food industry and in every State. The types of products and processes with which they work may depend on the locality. For example, in Maine and Idaho they work with potato processing; in the Midwest, with cereal products and meatpacking; and in Florida and California, with citrus fruits and vegetables.

Some food scientists do research for Federal agencies such as the Food and Drug Administration and the Departments of Agriculture and Defense; others work in State regulatory agencies. A few work for private consulting firms and international organizations such as the United Nations. Some teach or do research in colleges and universities. (See statement on college and university teachers elsewhere in the *Handbook.*)

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in food science, or in one of the physical or life sciences such as chemistry and biology, is the usual minimum requirement for beginning jobs in food science. An advanced degree is necessary for many jobs, particularly research and college teaching and for some management level jobs in industry.

About 60 colleges and universities offered programs leading to the bachelor's degree in food science in 1976. Undergraduate students majoring in food science usually take courses in physics, chemistry, mathematics, biology, the social sciences and humanities, and business administration, as well as a variety of food science courses. Food science courses cover areas such as preservation, processing, sanitation, and marketing of foods.

Most of the colleges and universities that provide undergraduate food science programs also offer advanced degrees. Graduate students usually specialize in a particular area of food science. Requirements for the master's or doctor's degree vary by institution, but usually include extensive laboratory work and a thesis.

People planning careers as food scientists should have analytical minds and like details and technical work. Food scientists must be able to express their ideas clearly to others.

Food scientists with a bachelor's degree might start work as quality assurance chemists or as assistant production managers. After gaining experience, they can advance to more responsible management jobs. A food scientist might also begin as a junior food chemist in a research and development laboratory of a food company, and be promoted to section head or another research management position.

People who have master's degrees may begin as senior food chemists in a research and development laboratory. Those who have the Ph. D. degree usually begin their careers doing basic research or teaching.

Employment Outlook

Employment of food scientists is expected to grow about as fast as the average for all occupations through the mid-1980's. Most openings will result from the need to replace those who die, retire, or transfer to other fields, although some openings will arise from employment growth.

Employment is expected to grow as the food industry responds to the challenge of providing wholesome and economical foods that can meet changing consumer preferences and food standards. In addition, both private households and food service institutions that supply customers such as airlines and restaurants will demand a greater quantity of processed convenience foods.

Employment opportunities should generally be favorable through the mid-1980's for food scientists with degrees in food science. Opportunities may not be as good for scientists with degrees in related fields such as chemistry or biology. Food scientists with advanced degrees are expected to have more favorable opportunities than those with only a bachelor's degree.

An increasing number of food scientists are expected to find jobs in research and product development. In recent years, expenditures for research and development in the food industry have increased moderately and probably will continue to rise. Through research, new foods are being produced from modifications of wheat, corn, rice, and soybeans. For example, food scientists are working to improve "meat" products made from vegetable proteins. There will be an increased need for food scientists in quality control and production because of the complexity of products and processes and the application of higher processing standards and new government regulations.

Earnings and Working Conditions

Food scientists had relatively high earnings in 1976, twice as high as the average for all nonsupervisory workers in private industry, except farming. Food scientists with the bachelor's degree had average starting salaries of about $11,300 a year in 1976. Those with a master's degree started at about $13,500, and those with the Ph. D. degree at about $17,400.

In the Federal Government in 1977, food scientists with a bachelor's degree could start at $9,303 or $11,523 a year, depending on their college grades. Those with a master's degree could start at $11,523 or $14,097, and those with the Ph. D. degree could begin at $17,056 or $20,442. The average salary for experienced food scientists in the Federal Government was about $21,500 a year in 1977.

Sources of Additional Information

For information on careers in food science, contact:

Institute of Food Technologists, Suite 2120, 221 North LaSalle St., Chicago, Ill. 60601.

FORESTERS

(D.O.T. 040.081)

Nature of the Work

Forests are a vital natural resource. They can be used repeatedly without being destroyed—if properly managed. The condition of our environment has become a major national concern, and foresters play an important role in protecting that environment by ensuring that our forests are properly used. Foresters manage, develop, and protect these lands and their resources—timber, water, wildlife, forage, and recreational areas.

Foresters plan and supervise the cutting and planting of trees. They also protect the trees from fire, harmful insects, and disease. Foresters may be responsible for other duties ranging from wildlife protection and watershed management to the development and supervision of camps, parks and grazing lands.

Foresters also do research, provide forestry information to forest owners and to the general public (called extension work), and teach at colleges and universities.

Foresters often specialize in one area of work, such as timber management, outdoor recreation, or forest economics. Some of these areas are recognized as distinct professions.

Places of Employment

About 25,000 persons worked as foresters in 1976. Nearly 2 out of 5 worked in private industry, mainly for pulp and paper, lumber, logging, and milling companies. About one-fourth worked for the Federal Government, primarily in the Forest Service of the Department of Agriculture. The remainder worked for State and local governments, colleges and universities, or consulting firms or were self-employed, either as consultants or forest owners.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in forestry is the minimum educational requirement for those desiring professional careers in forestry.

Foresters spend considerable time outdoors in all kinds of weather.

However, due to keen job competition and the increasingly complex nature of the forester's work, employers prefer graduates who hold advanced degrees. Certain jobs such as teaching and research require advanced degrees.

Education in forestry leading to a bachelor's or higher degree was offered in 1976 by 50 colleges and universities, of which 43 were accredited by the Society of American Foresters. Curriculums stress the liberal arts and communications skills as well as technical forestry subjects. Most programs also include courses in forest economics and business administration to supplement the student's scientific and technical knowledge. Many colleges require students to spend one summer in a field camp operated by the college. All schools encourage summer jobs that give firsthand experience in forest or conservation work.

In addition to meeting the intellectual demands of forestry, foresters must enjoy working outdoors, be physically hardy, and be willing to move, often to remote places. Foresters should also be able to work well with people and be able to express themselves clearly.

Forestry graduates usually work under the supervision of experienced foresters. After gaining experience, they may advance to more responsible positions. In the Federal Government, an experienced forester may supervise an entire forest area, and may advance to regional forest supervisor or to a top administrative position. In private industry, foresters start by learning the practical and administrative aspects of the business. Many foresters work their way up to top managerial positions within their companies.

Employment Outlook

Employment requirements for foresters are expected to grow about as fast as the average for all occupations through the mid-1980's. In recent years, however, the number of persons earning degrees in forestry has exceeded occupational requirements, creating competition for jobs. If the number of degrees granted each year remains at present levels, competition is expected to persist throughout the period. Opportunities will be better for those who can offer an employer either an advanced degree or several years' experience.

The country will need more foresters in the future to ensure an increasing output of forest products. Employment also may increase as we become more aware of the need to conserve and replenish our forest resources, and to improve the environmental quality of our forest lands.

Private owners of timberland may well employ more foresters as they recognize the need for—and the higher profitability of—improved forestry and logging practices. The forest products industry will require additional foresters to apply new techniques for using the entire forest crop, to develop methods of growing superior trees in a shorter period of time, and to do research in the fields of plant genetics and fertilization.

Employment of foresters will probably continue to grow faster in private industry than in the Federal Government where budget limitations may restrain growth. State government agencies will probably hire more foresters through Federal-State cooperative programs for fire control, protection against insects and disease, recreation, and technical assistance to owners of forest lands.

The expected rapid increase in the employment of forestry technicians will reduce the amount of time spent by foresters in performing routine tasks, but the forester will have to devote more and more time to supervisory work and to the general management of the forest.

Earnings and Working Conditions

The average starting salary for foresters in 1976 was $10,000 a year, while experienced foresters averaged over $18,000, according to the limited data available.

In private industry, starting foresters averaged $10,300 a year in 1976 and the overall average salary was $17,700, according to the limited data available.

Graduates entering the Federal Government as foresters in 1977 with just a bachelor's degree started at $9,303 a year. However, because of keen competition, most foresters hired by the Federal Government either held a master's degree or had some experience, and generally started at $11,523 a year. Ph. D.'s generally started at $14,097 or $17,056 a year. The median annual salary in 1977 for federally employed foresters exceeded $20,000.

In local government, foresters generally began at about $10,700 a year in 1976, while their median annual salary was $15,400. State governments paid about $9,200 annually to start in 1976, and State median salaries were $15,400 per year. College professors generally started at about $11,000 annually in 1976, while their median salary was over $20,000 per year. Many faculty foresters supplement their regular salaries with income from lecturing, consulting, and writing.

Many experienced foresters advance to jobs which require them to spend most of their time in an office. However, the beginning forester spends considerable time outdoors in all kinds of weather, sometimes in remote areas. Foresters may also work extra hours on emergency duty, as in firefighting or search and rescue missions.

Sources of Additional Information

General information about the forestry profession, lists of reading materials, and lists of schools offering education in forestry are available from:

Society of American Foresters, 5400 Grosvenor Lane, Washington, D.C. 20014.

National Forest Products Association, 1619 Massachusetts Ave., NW., Washington, D.C. 20036.

General career information is also available from:

American Forest Institute, 1619 Massachusetts Ave. NW., Washington, D.C. 20036.

American Forestry Association, 1319 18th St. NW., Washington, D.C. 20036.

For details on forestry careers in the Forest Service, contact:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

GEOGRAPHERS

(D.O.T. 017.281, 029.088, and 059.088)

Nature of the Work

Geographers study the spatial characteristics of the earth—and all that is found on it. Such studies help to explain changing patterns of human settlement—where people live, why they are located there, and how they earn a living.

Geographers are involved in a variety of activities. Most are college or university teachers; others are involved in research, writing, and other nonteaching activities. Their research includes the study and analysis of the distribution of land forms, climate, soils, vegetation, mineral, water, and human resources. They also analyze the distribution and structure of political organizations, transportation systems, marketing systems, urban systems, agriculture, and industry. Many geographers spend considerable time in field study, using surveying and meteorological instruments. They analyze maps, aerial photographs, and data transmitted by remote sensing equipment on satellites, and apply advanced statistical techniques in their work. Some geographers also construct maps, graphs, and diagrams.

Economic geographers deal with the geographic distribution of economic activities—including manufacturing, mining, agriculture, trade, and communications. *Political geographers* study the relationship of geographic conditions to political affairs. *Urban geographers* study cities and their problems and make recommendations about community planning and development, including housing, transportation, and industrial plant sites. (See statement on Urban Planners elsewhere in the *Handbook*.) The physical characteristics and processes affecting the earth are the concerns of *physical geographers*. Typically, they specialize in a particular branch of physical geography such as hydrology—the study of water and its effects, or geomorphology, which is the study of land forms. *Regional geographers* study the physical, economic, political, and cultural characteristics of a particular region or area, which may range in size from a river basin or an island, to a State, a country, or even a continent. *Cartographers* compile and interpret data and design and construct maps and charts. They also conduct research in surveying and mapping techniques and procedures. A growing number of *medical geographers* are concerned with the geographic aspects of human health problems and planning of health services. They study the effect of the natural environment on health, including such factors as climate, vegetation, mineral traces in water, and atmospheric pollution, as well as the geographic distribution of human health problems and health care facilities.

Some geographers specialize in making maps.

Formal training in geography provides the background for a wide range of jobs requiring expertise in environmental resources and planning, research methods, and a variety of other areas. Examples of such jobs are aerial photo interpreter, climatologist, community development specialist, ecologist, intelligence analyst, map analyst, land economist, marketing analyst, regional planner, research analyst, site researcher, and transportation planner. Jobs such as these generally require knowledge not only of geography, but of other disciplines as well. Particularly useful combinations include geography and economics, political science, sociology, anthropology, or urban planning.

Places of Employment

About 10,000 persons worked as geographers in 1976, excluding those teaching in secondary schools.

Colleges and universities employ about three-fifths of all geographers. However, the Federal Government is an important employer of geographers, and many work in the Washington, D.C. area. For these geographers, employed mostly by mapping and intelligence agencies, skills in cartography, aerial photograph interpretation, and remote sensing are important.

The principal Federal employers are the Departments of Defense, Interior, Commerce, and Agriculture. Other agencies include the Departments of State; Transportation; and

Health, Education, and Welfare; and the Environmental Protection Agency (EPA), National Aeronautical and Space Administration (NASA), Energy Research and Development Agency (ERDA), and Central Intelligence Agency (CIA).

State and local governments employ a growing number of geographers, mostly on city and State planning and development commissions.

Private industry employs a small but growing number of geographers involved in research, planning, and location analysis. Most work for textbook and map publishers, travel agencies, manufacturing firms, real estate development corporations, insurance companies, communications and transportation firms, or chain stores. Others work for scientific foundations and research organizations, or run their own research or consulting business.

Training, Other Qualifications, and Advancement

The minimum educational requirement for beginning positions in geography in government, industry, or secondary schools usually is a bachelor's degree with a major in the field. Bachelor's degree holders would find it helpful to have training in a specialty such as cartography, aerial photograph or remote sensing data interpretation, statistical analysis, or environmental analysis.

A master's degree usually is the minimum requirement for the position of college instructor, and is important for advancement in business and government. In many colleges and universities, however, a Ph. D. degree usually is required for a professorship and often is necessary to gain tenure. The Ph. D. degree often is necessary for senior level planning, research, and administrative positions in government, industry, research organizations, and consulting firms.

In the Federal Government, geographers generally must have a minimum of 24 semester hours in geography or related fields. Requirements may vary for certain specialties such as cartography.

About 400 colleges and universities offered programs in geography in 1976. Undergraduate study provides a general introduction to the field of geography and often includes field study. Research methods and writing skills also are taught. Typical courses offered are physical geography, cultural geography, climatology and meteorology, economic geography, political geography, urban geography, and quantitative methods in geography. Courses in cartography, remote sensing, historical geography, ecology, natural resource planning, social geography, geography of transportation, geographic aspects of pollution, and geography of various regions also are offered. Geography majors should take appropriate electives in other departments. For example, courses in economics, architecture, urban planning, and urban and rural sociology are important for planners; courses in drawing, design, computer science, and mathematics are important for cartographers; and courses in physics, botany, and geology are important for physical geographers.

In 1976, about 150 institutions offered master's degree programs; 55 offered Ph. D. programs. Applicants are required to have a bachelor's degree in any of the social or physical sciences with a substantial background in geography. Requirements for advanced degrees include field and laboratory work as well as advanced classroom study in geography and preparation of a thesis. Many graduate schools also require course work in advanced mathematics, statistics, and computer science because of the increasing emphasis on these areas in the field. A language may be required for those students who plan to enter the field of foreign regional geography.

Students should select graduate schools that offer appropriate areas of specialization and good research opportunities in nearby libraries, archives, laboratories, and field stations. Employment often is available at area government agencies or research, scientific, or industrial firms.

Persons who want to become geographers should enjoy reading, studying, and research because they must keep abreast of developments in the field. Geographers must work with abstract ideas and theories as well as do practical studies. They also must be able to work independently and communicate their ideas orally and in writing.

Employment Outlook

Employment of geographers is expected to grow faster than the average for all occupations through the mid-1980's. However, most openings are likely to result from deaths, retirements, and other separations from the labor force.

Little growth is anticipated in college and university teaching, the traditional employer of many highly qualified geographers; as a result, many such geographers may seek nonacademic positions. Many opportunities are becoming available in the fields of health services planning and environmental management and planning, including such areas as land and water resources planning and flood management. Significant growth in the number of jobs requiring knowledge of remote sensing, cartography, and climatology also is expected. The Federal Government will need additional personnel to work in programs such as health planning, regional development, environmental quality, and intelligence. Employment of geographers in State and local government is expected to expand, particularly in areas such as health planning, conservation, environmental quality, highway planning, and city, community, and regional planning and development. Private industry is expected to hire increasing numbers of geographers for market research and location analysis.

The employment outlook for geographers with the Ph. D. is expected to be favorable through the mid-1980's for research and administrative positions in government, industry, research organizations, and consulting firms. Ph. D. 's may face competition for academic positions, although those graduating from high-ranking universities should have an advantage. Those with the master's degree are likely to face competition for academic positions, but should have good opportunites for planning and marketing positions in government and industry.

Graduates with a bachelor's degree in geography are expected to face competition for jobs as geographers. Some may find jobs as cartographers, climatologists, or intelligence analysts, while many of these degree holders may find employment in government and industry as management trainees, research assistants, or administrative assistants. Others may obtain employment as research or teaching assistants in educational institutions while studying for advanced degrees. Some bachelor's degree holders teach at the high school level, although in some States the master's degree is becoming essential for high school teaching positions. Others earn library science degrees and become map librarians.

Earnings and Working Conditions

According to the 1975-76 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,000 a year; master's degree candidates in the social sciences, around $12,000.

According to an Association of American Geographers survey, Ph. D.'s with no teaching experience earned starting salaries between $12,000 and $14,000 for the academic year 1975-76, while the average salary of geographers employed in colleges and universities was $19,000. Salaries of geographers in planning positions in business and industry are comparable to those in the Federal Government.

Geographers in educational institutions usually have an opportunity to earn income from other sources, such as consulting work, special research, and publication of books and articles. In general, salaries of experienced geographers are higher than the average for all nonsupervisory workers in private industry, except farming.

The Civil Service Commission recognizes education and experience in certifying applicants for entry level positions in the Federal Government. In general, geographers in the Federal Government with the bachelor's degree and no experience started at $9,303 or $11,523 a year in 1977, depending on their college achievement. Those with a master's degree started at $14,097 a year, and those with the Ph. D. at $17,056. Geographers and cartographers in the Federal Government averaged around $21,100 in 1977.

Geographers sometimes must do field work in primitive regions of the world, requiring an ability to adapt to different social and cultural environments.

Sources of Additional Information

For additional information on careers and job openings for geographers, and on schools offering various programs in geography, contact:

Association of American Geographers, 1710 16th St. NW., Washington, D.C. 20009.

GEOLOGISTS

(D.O.T. 024.081)

Nature of the Work

Geologists study the structure, composition, and history of the earth's crust. By examining surface rocks and drilling to recover rock cores, they determine the types and distribution of rocks beneath the earth's surface. They also identify rocks and minerals, conduct geological surveys, draw maps, take measurements, and record data. Geological research helps to determine the structure and history of the earth and may result in significant advances such as the ability to predict earthquakes. An important application of geologists' work is locating oil and other minerals.

Geologists use many tools and instruments such as hammers, chisels, levels, transits (mounted telescopes used to measure angles), gravity meters, cameras, compasses, and seismographs (instruments that record the intensity and duration of earthquakes and earth tremors). They may evaluate information from photographs taken from aircraft and satellites and use computers to record and analyze data.

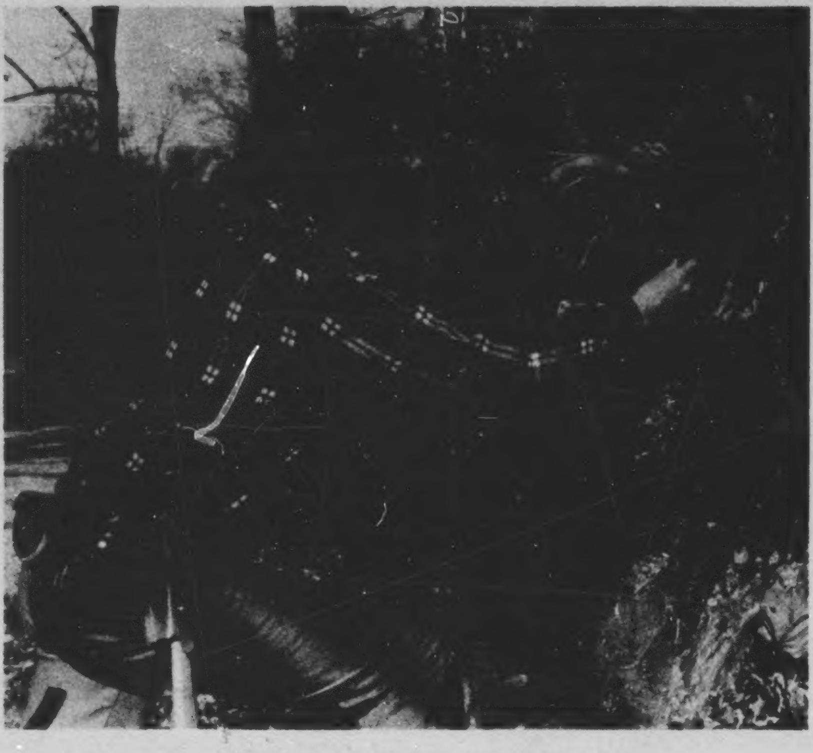
Geologists also examine chemical and physical properties of specimens in laboratories under controlled temperature and pressure. They may study fossil remains of animal and vegetable life or experiment with the flow of water and oil through rocks. Laboratory equipment used by geologists includes complex instruments such as the X-ray diffractometer, which determines the structure of minerals, and the petrographic microscope, used for close study of rock formations.

Besides locating resources and working in laboratories, geologists also are called on to advise construction companies and governmental agencies on the suitability of certain locations for constructing buildings, dams, or highways. Some geologists administer and manage research and exploration programs. Others teach and work on research projects in colleges and universities.

Geologists usually specialize in one or a combination of three general areas—earth materials, earth processes, and earth history.

Economic geologists locate earth materials such as minerals and solid fuels. *Petroleum geologists* search for and recover oil and natural gas. Some petroleum geologists work near drilling sites and others correlate petroleum related geologic information for entire regions. *Engineering geologists* determine suitable sites for the construction of roads, airfields, tunnels, dams, and other structures. They decide, for example, whether underground rocks will bear the weight of a building or whether a proposed structure may be in an earthquake-prone area. *Mineralogists* analyze and classify minerals and precious stones according to composition and structure. *Geochemists* study the chemical composition and changes in minerals and rocks to understand the distribution and migration of elements in the earth's crust.

Geologists concerned with earth processes study land forms and their rock masses, sedimentary deposits (matter deposited by water or wind)



Geologist examining surface rocks.

and eruptive forces such as volcanoes. *Volcanologists* study active and inactive volcanoes, and lava flows and other eruptive activity. *Geomorphologists* examine landforms and those forces, such as erosion and glaciation, which cause them to change.

Other geologists are primarily concerned with earth history. *Paleontologists* study plant and animal fossils to trace the evolution and development of past life. *Geochronologists* determine the age of rocks and land forms by the radioactive decay of their elements. *Stratigraphers* study the distribution and arrangement of sedimentary rock layers by examining their fossil and mineral content.

Many geologists specialize in new fields that require knowledge of another science as well. *Astrogeologists* study geological conditions on other planets. *Geological oceanographers* study the sedimentary and other rock on the ocean floor and continental shelf. (See statements on oceanographers and mining elsewhere in the *Handbook*.)

Places of Employment

More than 34,000 people worked as geologists in 1976. More than three-fifths of all geologists work in private industry. Most industrial geologists work for petroleum companies. Geologists also work for mining and quarrying companies. (See statements on the mining and petroleum industries elsewhere in the *Handbook*.) Some are employed by construction firms. Others are independent consultants to industry and government.

The Federal Government employs over 2,000 geologists. Two-thirds work for the Department of the Interior in the U.S. Geological Survey, the Bureau of Mines, and the Bureau of Reclamation. State agencies also employ geologists, some working on surveys in cooperation with the U.S. Geological Survey.

Colleges and universities employ about 9,500 geologists. Some work for nonprofit research institutions and museums.

Employment of geologists is concentrated in those States with large oil and mineral deposits. Almost two-thirds work in five States: Texas, California, Louisiana, Colorado, and Oklahoma. Some are employed by American firms overseas for varying periods of time.

Training, Other Qualifications, and Advancement

A bachelor's degree in geology or a related field is adequate for entry into some geology jobs. An advanced degree is helpful for promotion in most types of work, and is essential for college teaching and many research positions.

About 300 colleges and universities offer a bachelor's degree in geology. Undergraduate students devote about one-fourth of their time to geology courses, including physical, structural and historical geology, mineralogy, petrology, and invertebrate paleontology, about one-third of their time taking mathematics, related sciences—such as physics and chemistry—and engineering; and the remainder on general academic subjects.

More than 160 universities award advanced degrees in geology. Graduate students take advanced courses in geology and specialize in one branch of the science.

Students planning careers in exploration geology should like the outdoors, and must have physical stamina.

Geologists usually begin their careers in field exploration or as research assistants in laboratories. With experience, they can be promoted to project leader, program manager, or other management and research positions.

Employment Outlook

Employment opportunities in geology are expected to be good for those with degrees in geology or in a related science with courses in geology. The employment of geologists is expected to grow faster than the average for all occupations through the mid-1980's. This growth will create many new openings each year. Many additional openings will be created each year by geologists who retire, die, or leave the occupation.

Increased prices for petroleum and the necessity to locate new sources of other minerals as older sources become exhausted will stimulate domestic exploration activities and require many additional geologists. Additional geologists also will be needed to discover new resources and their potential uses. For example, geologists will help determine the feasibility of using geothermal energy (steam from the earth's interior) to generate electricity. Geologists are needed to devise techniques for exploring deeper within the earth's crust and to develop more efficient methods of mining resources. They also are needed to develop adequate water supplies and waste disposal methods, and to do site evaluation for construction activities.

Earnings and Working Conditions

Geologists have relatively high salaries, with average earnings over twice those of nonsupervisory workers in private industry, except farming.

According to a survey done by the College Placement Council, in early 1977 graduates with bachelor's degrees in other physical and earth sciences received average starting offers of $13,300 a year. Graduates with master's degrees in geology and related geological sciences received average starting offers of $14,900 per year.

In the Federal Government in 1977, geologists having a bachelor's degree could begin at $9,303 or $11,523 a year, depending on their college records. Those having a master's degree could start at $11,523 or $14,097 a year; those having the Ph. D. degree at $17,056 or $20,442. In 1977, the average salary for geologists employed in the Federal Government was over $25,000 a year.

Conditions of work vary. Exploration geologists often work overseas. Geologists travel to remote sites by helicopter and jeep, and cover large areas by foot, often working in teams. Geologists in mining sometimes work underground. When not working outdoors, they are in comfortable, well-lighted, well-ventilated offices and laboratories.

Sources of Additional Information

General information on training and career opportunities for geologists is available from:

American Geological Institute, 5205 Leesburg Pike, Falls Church, Va. 22041.

For information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

GEOPHYSICISTS

(D.O.T. 024.081)

Nature of the Work

Geophysicists study the composition and physical aspects of the earth and its electric, magnetic, and gravitational fields. Geophysicists use highly complex instruments such as the magnetometer which measures variations in the earth's magnetic field, and the gravimeter which measures minute variations in gravitational attraction. They often use satellites to conduct tests from outer space and computers to collect and analyze data.

Geophysicists usually specialize in 1 of 3 general phases of the science—solid earth, fluid earth, and upper atmosphere. Some may also study other planets.

Solid earth geophysicists search for oil and mineral deposits, map the earth's surface, and study earthquakes. *Exploration geophysicists* use seismic prospecting techniques to locate oil and mineral deposits. They send sound waves into the earth and record the echoes bouncing off the rock layers below to determine if conditions are favorable for the accumulation of oil.

Seismologists study the earth's interior and earth vibrations caused by earthquakes and manmade explosions. They explore for oil and minerals, study underground detection of nuclear explosions, and provide information for use in constructing bridges, dams, and buildings. For example, in constructing a dam, seismologists determine where bedrock (solid rock beneath the soil) is closest to the surface so the best dam site can be selected. They use explosives or other methods to create sound waves that reflect off bedrock; the time it takes for the shock wave to return to the surface indicates the depth of bedrock. Seismologists also seek to understand the causes of earthquakes so that one day they might be predicted.

Geodesists study the size, shape, and gravitational field of the earth and other planets. Their principal task is precise measurement of the earth's surface. With the aid of satellites, geodesists determine the positions, elevations, and distances between points on the earth, and measure the intensity and direction of gravitational attraction.

Hydrologists are concerned with the fluid earth. They may study the distribution, circulation, and physical properties of underground and surface waters, including glaciers, snow, and permafrost. They also may study rainfall and its rate of infiltration into soil. Some are concerned with water supplies, irrigation, flood control, and soil erosion. (See statement on oceanographers, sometimes classified as geophysical scientists, elsewhere in the *Handbook*.)

Geophysicists also study the atmosphere, investigate the earth's magnetic and electric fields, and compare its outer atmosphere with those of other planets. *Geomagneticians* study the earth's magnetic field. *Paleomagneticians* learn about past magnetic fields from rocks or lava flows. *Planetologists* study the composition and atmosphere of the moon, planets, and other bodies in the solar system. They gather data from geophysical instruments placed on interplanetary space probes or from equipment used by astronauts during the Apollo missions. *Meteorologists* sometimes are classified as geophysical scientists. (See statement on meteorologists elsewhere in the *Handbook*.)

Places of Employment

About 12,000 people worked as geophysicists in 1976. Most work in

Some geophysicists work in research laboratories.

private industry, chiefly for petroleum and natural gas companies. (See statement on the mining and petroleum industry elsewhere in the *Handbook.*) Others are in mining companies, exploration and consulting firms, and research institutes. A few are independent consultants and some do geophysical prospecting on a fee or contract basis.

Geophysicists are employed in many southwestern and western States, and in those on the Gulf Coast, where large oil and natural gas fields are located. Some geophysicists are employed by American firms overseas for varying periods of time.

Almost 2,300 geophysicists, geodesists, and hydrologists worked for Federal Government agencies in 1976, mainly the U.S. Geological Survey; the National Oceanic and Atmospheric Administration (NOAA); and the Defense Department. Other geophysicists work for colleges and universities, State governments, and nonprofit research institutions.

Training, Other Qualifications, and Advancement

A bachelor's degree in geophysics or a geophysical specialty is sufficient for most beginning jobs in geophysics. A bachelor's degree in a related field of science or engineering also is adequate preparation, provided the person has courses in geophysics, physics, geology, mathematics, chemistry, and engineering.

Geophysicists doing research or supervising exploration activities should have graduate training in geophysics or a related science. Those planning to teach in colleges or do basic research should acquire a Ph. D. degree.

About 50 colleges and universities award the bachelor's degree in geophysics. Other programs offering training for beginning geophysicists include geophysical technology, geophysical engineering, engineering geology, petroleum geology, and geodesy.

More than 60 universities grant the master's and Ph. D. degree in geophysics. Candidates with a bachelor's degree which includes courses in geology, mathematics, physics, engineering, or a combination of these subjects can be admitted.

Geophysicists often work as part of a team. They should be curious, analytical, and able to communicate effectively.

Most new geophysicists begin their careers doing field mapping or exploration. Some assist senior geophysicists in research laboratories. With experience, geophysicists can advance to jobs such as project leader or program manager, or other management and research jobs.

Employment Outlook

Employment opportunities are expected to be very good for graduates with a degree in geophysics or a related field, though few openings are expected. Nevertheless, the number of people qualified to enter the field may fall short of requirements if present trends in the number obtaining geophysics training continue.

Employment of geophysicists is expected to grow faster than the average for all occupations through the mid-1980's. As known deposits of petroleum and other minerals are depleted, petroleum and mining companies over the next decade will need increasing numbers of geophysicists who can use sophisticated electronic techniques to find less acessible fuel and mineral deposits.

In addition, geophysicists with advanced training will be needed to do research on radioactivity and cosmic and solar radiation and to investigate the use of geothermal power (steam from the earth's interior) as a source of energy to generate electricity.

Federal agencies are expected to hire more geophysicists for new and expanding programs. Through the mid-1980's, jobs will depend heavily on funds for research and development in earth sciences as the Government supports energy research in both established and alternative sources. The Government also may fund research to locate more natural resources and to prevent environmental damage through better land use.

Earnings and Working Conditions

Geophysicists have relatively high salaries, with average earnings more than twice those of nonsupervisory workers in private industry, except farming.

According to a survey done by the College Placement Council, in early 1977 graduates with bachelor's degrees in other physical and earth sciences received average starting offers of $13,300 a year. Graduates with master's degrees in geology and related geological sciences received average starting offers of $14,900 per year.

In the Federal Government in 1977, geophysicists having a bachelor's degree could begin at $9,303 or $11,523 a year, depending on their college records. Geophysicists having a master's degree could start at $11,523 or $14,841 a year; those having a Ph. D. degree, at $17,056 or $20,442. In 1977, the average salary for geophysicists employed by the Federal Government was about $24,500 a year.

Many geophysicists work outdoors and must be willing to travel for extended periods of time. Some work at research stations in remote areas, or aboard ships and aircraft equipped with sophisticated geophysical equipment. When not in the field, geophysicists work in modern, well-equipped, well-lighted laboratories and offices.

Sources of Additional Information

General information on career opportunities, training, and earnings for geophysicists is available from:

American Geophysical Union, 1909 K St. NW., Washington, D.C. 20006.

Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Okla. 74101.

For information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St., NW., Washington, D.C. 20415.

HEALTH AND REGULATORY INSPECTORS (GOVERNMENT)

(D.O.T. 168.168, and .287)

Nature of the Work

Protecting the public from health and safety hazards, prohibiting unfair trade and employment practices, and raising revenue are included in the wide range of responsibilities of government. Health and regulatory inspectors help insure observance of the laws and regulations that govern these responsibilities. For discussion of a third type of inspector, see the statement on construction inspectors (Government) elsewhere in the *Handbook*.

The duties, titles, and responsibilities of Federal, State, and local health and regulatory inspectors vary widely. Some types of inspectors work only for the Federal Government while others also are employed by State and local governments. Many other workers employed as accountants, agricultural cooperative extension service workers, and other agricultural professionals also have inspection duties.

Health Inspectors. Health inspectors work with engineers, chemists, microbiologists, and health workers to insure compliance with public health and safety regulations governing food, drugs, and various other consumer products. They also administer regulations that govern the quarantine of persons and products entering the United States from foreign countries. The major types of health inspectors are: Food and drug, meat and poultry, and agricultural quarantine inspectors. In addition, some inspectors work in a field that is closely related to food inspection—agricultural commodity grading.

Most *food and drug inspectors* specialize in one area of inspection such as food, feeds and pesticides, weights and measures, or drugs and cosmetics. Some, especially those who work for the Federal Government, may be proficient in several of these areas. Working individually or in teams under the direction of a senior or supervisory inspector, they travel throughout a geographical area to check periodically firms that produce, handle, store, and market food, drugs, and cosmetics. They look for evidence of inaccurate product labeling, decomposition, chemical or bacteriological contamination, and other factors that could result in a product becoming harmful to consumer health. They assemble evidence of violations, using portable scales, cameras, ultraviolet lights, container sampling devices, thermometers, chemical testing kits, and other types of equipment.

Product samples collected as part of their examinations are sent to laboratories for analysis. After completing their inspection, inspectors discuss their observations with the management of the plant and point out any areas where corrective measures are needed. They prepare written reports of their findings, and, when necessary, compile evidence that may be used in court if legal actions must be taken to effect compliance with the law.

Federal and State laws empower *meat and poultry inspectors* to inspect meat, poultry, and their byproducts to insure that they are wholesome and safe for public consumption. Working as part of a constant onsite team under the general supervision of a veterinarian, they inspect meat and poultry slaughtering, processing, and packaging operations. They also check to see that products are labeled correctly and that proper sanitation is maintained in slaughtering and processing operations.

Agricultural quarantine inspectors protect American agricultural products from the introduction and spread of foreign plant pests and animal diseases. To safeguard crops, forests, and gardens, they inspect ships, aircraft, railroad cars, and motor vehicles entering the United States for the presence of restricted or prohibited plant or animal materials.

Environmental health inspectors, or sanitarians, work primarily for State and local governments. These inspectors perform a variety of inspection duties to help insure that the food people eat, the water they drink, and the air they breathe meet government standards. They check the cleanliness and safety of food and beverages produced in dairies and processing plants, or served in restaurants, hospitals, and other institutions. They often examine the handling, processing, and serving of food for compliance with sanitation rules and regulations.

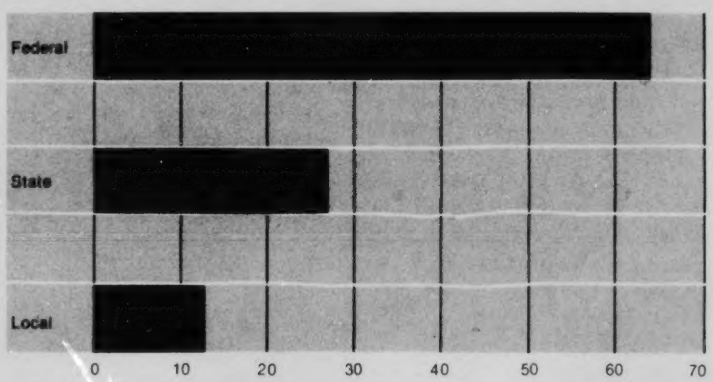
Environmental health inspectors concerned with waste control oversee the treatment and disposal of sewage, refuse, and garbage. They examine places where pollution is a danger, perform tests to detect pollutants, and collect air or water samples for analysis. They determine the nature and cause of the pollution, then initiate action to stop it.

In large local and State health or agriculture departments, environmental health inspectors may specialize in areas of work such as milk and dairy products, food sanitation, waste control, air pollution, institutional sanitation, and occupational health. In rural areas and small cities, they may be responsible for a wide range of environmental health activities.

Agricultural commodity graders apply quality standards to various commodities to insure that retailers and consumers receive good and reliable products. They generally specialize in an area such as eggs and egg products, processed or fresh fruits and vegetables, grain, or dairy products. They inspect samples of a particular product to determine its quality and grade, and issue official grading certificates. Graders also may inspect the plant and equipment to insure that adequate sanitation standards are maintained.

Most health and regulatory inspectors are employed by the Federal Government

1976 employment (in thousands)



Source Bureau [illegible] Labor Statistics

Regulatory Inspectors. Regulatory inspectors insure compliance with various laws and regulations that protect the public welfare. Important types of regulatory inspectors are: Immigration; customs; aviation safety; mine; wage-hour compliance; alcohol, tobacco, and firearms; and occupational safety inspectors.

Immigration inspectors interview and examine people seeking admission, readmission, or the privileges of passing through or residing in the United States. They inspect the passports of those seeking to enter the United States to determine whether they are legally eligible to enter and to verify their citizenship, status, and identity. Immigration inspectors also prepare reports, maintain records, and process applications and petitions by aliens for privileges such as immigrating to or living temporarily in the United States.

Customs inspectors enforce the laws governing U.S. imports and exports. Stationed at airports, seaports, and border crossing points, they count, weigh, gauge, measure, and sample commercial cargoes entering and leaving the United States to determine the amount of tax that must be paid. They also inspect baggage and articles worn or carried by the passengers and crew of ships, aircraft, and motor vehicles to insure that all merchandise being brought through ports of entry is declared and the proper taxes paid.

Aviation safety officers insure that Federal Aviation Administration (FAA) regulations that govern the quality and safety of aircraft equipment and personnel are maintained. Aviation safety officers may inspect aircraft manufacturing, maintenance, or operations procedures. They usually specialize in inspecting either commercial or general aviation aircraft. They are responsible for the inspection of aircraft manufacturing and of major repairs. They also certify aircraft pilots and schools, pilot examiners, flight instructors, and instructional materials.

Mine inspectors work to insure the health and safety of miners and to promote good mining practices. To insure compliance with safety laws and regulations, mine inspectors visit mines and related facilities to obtain information on health and safety conditions.

Mine inspectors discuss their findings with the management of the mine, prepare written reports that incorporate their findings and decisions, and issue notices of findings that describe violations and hazards that must be corrected. They also investigate and prepare reports on mine accidents and direct rescue and firefighting operations when fires or explosions occur.

Wage-hour compliance officers inspect the employer's time, payroll, and personnel records to insure compliance with the provisions of various Federal laws on minimum wages, overtime, pay, employment of minors, and equal employment opportunity. They often interview employees to verify the employer's records and to check for any complaints.

Alcohol, tobacco, and firearms inspectors insure that the industries which manufacture these products comply with the provisions of revenue laws and other regulations on operating procedures, unfair competition, and trade practices. They spend most of their time inspecting distilleries, wineries, and breweries; cigar and cigarette manufacturing plants; wholesale liquor dealers and importers; firearms and explosives manufacturers, dealers, and users; and other regulated facilities. They periodically audit these establishments to determine that appropriate taxes are correctly determined and paid.

Places of Employment

About 115,000 persons worked as health and regulatory inspectors in 1976. Nearly two-thirds of all health and regulatory inspectors work for the Federal Government, although State and local governments also employ large numbers. The largest single employer of food and drug inspectors is the U.S. Food and Drug Administration, but the majority work for State governments. Meat and poultry inspectors and commodity graders who work in processing plants are employed mainly by the U.S. Department of Agriculture. Agricultural quarantine inspectors work either for the U.S. Public Health Service or the U.S. Department of Agriculture. Environmental health inspectors work primarily for State and local governments.

Regulatory inspectors work for various agencies within the Federal Government, mainly in regional and district offices throughout the United States. Aviation safety officers work for the Federal Aviation Administration; wage-hour compliance officers, for the Department of Labor; mine inspectors, the Department of the Interior; and alcohol, tobacco, and firearms inspectors, the Treasury Department. Immigration, customs, and agricultural quarantine inspectors work at U.S. airports, seaports, border crossing points, and at foreign airports and seaports. They are employed by the Justice and Treasury Departments.

Training, Advancement, and Other Qualifications

Because inspectors perform such a wide range of duties, qualifications for employment in these positions vary greatly. The Federal Government requires a passing score on the Professional and Administrative Career Examination (PACE) for several inspector occupations, including immigration; customs; wage and hour compliance; alcohol, tobacco, and firearms; occupational safety; and consumer safety (food and drug). To take this examination, a bachelor's degree or 3 years of responsible work experience, or a combination of the two, are required. In some cases, agencies will give preference to an applicant whose course work or work experience is related to the field of employment.

Other Federal inspectors must pass an examination based on specialized knowledge, in addition to having work experience in related fields. These include commodity inspectors such as those in meat, poultry, livestock, and egg products.

Air safety inspectors must have considerable experience in aviation maintenance, and an FAA Air Frame and Power Plant certificate. In addition, various pilot certificates and considerable flight experience are required, with the type dependent on the inspection duties. Many air safety inspectors receive both their flight training and mechanical training in the Armed Forces. No written examination is required.

Applicants for mine safety inspector positions generally must have specialized work experience in mine management or supervision, or possess a skill such as electrical engineering (for mine electrical inspectors). In some cases, a general aptitude test may be required.

Some Civil Service registers, including those for agricultural quarantine inspectors and fruit and vegetable graders, rate applicants solely on their experience and education and require no written examination.

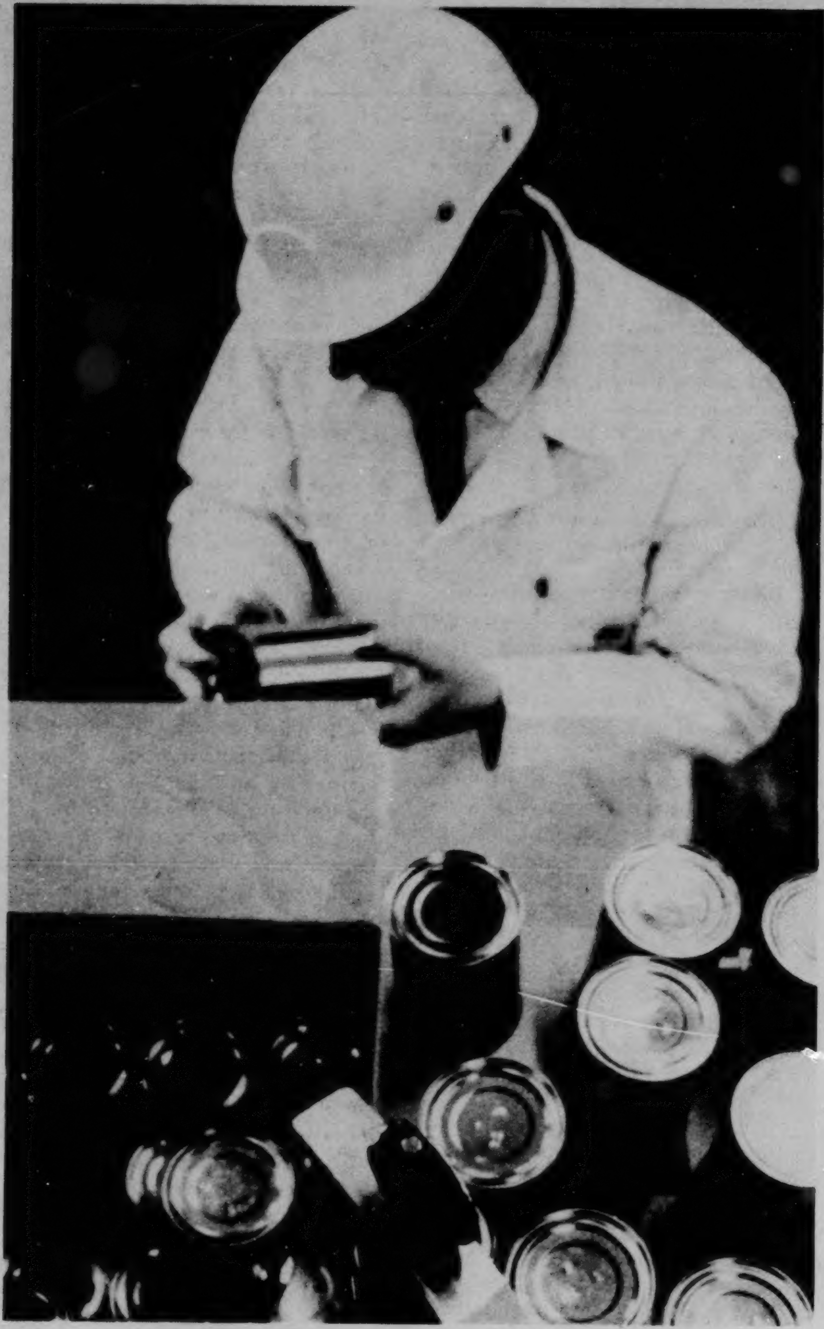
Qualifications for inspectors at the State and local level usually are similar to those for Federal employees. However, this may vary among government employers, particularly at the local level. Environmental health inspectors, called sanitarians in many States, must have a bachelor's degree in environmental health or the physical or biological sciences. In 35 States, they are licensed and their qualifications regulated by examining boards.

All inspectors are trained in the laws and inspection procedures related to their specific field through a combination of classroom and on-the-job training. In general, people who want to become health and regulatory inspectors should be able to accept responsibility and like detailed work. They should be neat and personable and able to express themselves well orally and in writing.

All Federal Government inspectors are promoted on a Civil Service "career ladder." This means that, assuming satisfactory work performance, workers will advance automatically, usually at 1-year intervals, to a specified maximum level. Above this level (usually supervisory positions), advancement is competitive, based on needs of the agency and individual merit.

Employment Outlook

Employment of health and regulatory inspectors as a group is expected to increase faster than the average for all occupations through the mid-1980's. The growth in employment of health inspectors is expected to be more rapid than that of regulatory inspectors. In addition to job oppor-



Public concern for improved quality and safety of consumer products will require additional inspectors to insure compliance.

tunities stemming from growth, many inspectors will be needed each year to replace those who die, retire, or transfer to other occupations.

Increased food consumption caused by population growth and greater public concern over potential health hazards should create additional jobs for food and drug, meat and poultry, and other commodity inspectors and graders. Public concern for improved quality and safety of consumer products also should result in new legislation in these areas, requiring additional inspectors to insure compliance.

Aviation industry growth, increased international travel, and increases in the volume of U.S. imports and exports should continue to create new openings for aviation safety officers, quarantine and immigration inspectors, and customs inspectors. Increasing coal mining activity and concern over mine safety should create additional mine inspector jobs. Continued public pressure for equal employment rights should cause a growing need for wage-hour compliance officers.

Earnings and Working Conditions

With the exception of mine inspectors and aviation safety officers, the Federal Government paid health and regulatory inspectors and graders starting salaries of $9,303 or $11,523 a year in 1977, depending on the type of position and the qualifications of the applicant. Aviation safety officers and mining inspectors usually received starting salaries of $14,097.

Salaries of experienced meat and poultry inspectors, egg product inspectors, agricultural quarantine inspectors, alcohol, tobacco, and firearms inspectors, and customs and immigration inspectors were over $14,000 a year in 1977. Experienced food and drug inspectors (consumer safety officers), mine inspectors, and wage-hour compliance officers usually received salaries of about $20,000 from the Federal Government in 1977. Experienced aviation safety officers averaged over $24,000 a year.

Nonsupervisory environmental health inspectors working for selected U.S. cities and counties received average starting salaries about $11,000 in 1976; those working for State governments started at about $1,000 less. Experienced environmental health inspectors working for State governments earned between $11,500 and $15,200, but those in top supervisory and administrative positions had salaries between $15,500 and $20,500 in 1976.

Most health and regulatory inspectors live an active life, meeting many people and working in a variety of environments. Many travel frequently and are usually furnished with an automobile or reimbursed for travel expenses.

At times inspectors must work under unfavorable working conditions. For example, meat and poultry, and alcohol, tobacco, and firearms inspectors frequently come in contact with strong, unpleasant odors; mine inspectors often spend a great deal of time in mines where they are exposed to the same hazards as miners. Many inspectors work long and often irregular hours.

Sources of Additional Information

For facts about inspector careers in the Federal Government, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

More detailed information on qualifications for Federal jobs is available from local Civil Service Commission offices or from individual Federal agencies.

Information about career opportunities as inspectors in State and local governments is available from State civil service commissions, usually located in each State capital, or from local government offices.

HEALTH SERVICES ADMINISTRATORS

(D.O.T. 169.168, 187.118, and 187.168)

Nature of the Work

Medical and health care is provided by organizations that vary from large teaching hospitals to small walk-in clinics. Each of these requires effective management to function properly. Health administrators, under the general supervision of boards of directors or other governing bodies, provide this management.

Administrators coordinate the various functions and activities that make a health organization work. They may do this personally, where the organization is small, or direct a staff of assistant administrators in larger organizations. Health administrators make management decisions on matters such as the need for additional personnel and equipment, current and future space requirements, and the budget.

Some health services administrators, including those who manage hospitals or nursing homes, oversee nursing, food services, and in-service training programs. Assistant administrators usually direct the daily operations of these departments; however, the chief executive keeps informed through formal and informal meetings with the assistants, the medical staff, and others. In addition to these management activities, many health administrators help to carry out fundraising drives and promote public participation in health programs. This phase of the administrator's job often includes speaking before civic groups, arranging publicity, and coordinating the activities of the organization with those of government or community agencies.

Places of Employment

About 160,000 persons worked as health services administrators in 1976. Most administrators work in health facilities, including hospitals (which employed about half of all administrators), nursing and personal care homes, and health management firms that provide administrative services to health facilities at a specified contract price.

Some health administrators work for government agencies, including State and local health departments and the U.S. Public Health Service. In addition, the Federal Government hires administrators in Veterans Administration and Armed Forces hospitals and clinics. Others work for voluntary health agencies that conduct research and provide care and treatment for victims of particular diseases or physical impairments.

Training, Other Qualifications, and Advancement

Educational requirements for health services administrators vary

Administrators coordinate the various activities of a health organization.

according to the position's level of responsibility and the size of the organization. Generally, larger organizations with more complicated administrative structures require higher credentials than smaller ones.

Applicants with master's degrees in health or hospital administration may be hired as associate or assistant administrators in hospitals, while those with master's degrees in public health often find work as program analysts or program representatives in public health departments. Very few master's degree recipients take entry positions in nursing or personal care homes, although many nursing home administrators pursue graduate education while employed.

Bachelor's degree recipients usually begin their careers as administrative assistants or department heads in hospitals, or as assistant administrators in nursing homes. Graduates of 2-year, associate degree programs generally are hired as unit directors or assistant department heads in hospitals, or as assistants to program representatives in public health departments. Some associate degree holders find assistant administrator jobs in small nursing homes.

The Ph. D. degree usually is required for positions in teaching or research, and is an asset for those seeking administrative jobs in the larger, more prestigious health organizations. Although some public health departments still require chief administrators to be physicians, the trend is away from this.

Administrators in Armed Forces hospitals usually are career military personnel.

In 1976, over 40 bachelor and associate degree programs in health services administration were offered—the majority were 4-year curriculums. In addition, there were about 52 programs in hospital or health services administration that led to the master's degree, and 19 schools of public health offered programs leading to a master's degree in public health.

To enter graduate programs, applicants must have a bachelor's degree, with courses in natural sciences, psychology, sociology, statistics, accounting, and economics. Competition for entry to these programs is keen, and applicants need above average grades to gain admission. The programs generally last about 2 years and may include some supervised administrative experience in hospitals, clinics, or health agencies. Programs may include courses such as hospital organization and management, accounting and budget control, personnel administration, public health administration, and the economics of health care.

All States and the District of Columbia require that the administrator of a nursing or personal care home be licensed. Requirements are not uniform, but they generally specify a level of education, such as a bachelor's degree, plus some amount of experience in the field.

Personal qualifications needed for success as a health administrator include initiative and an interest in helping the sick. Administrators should be able to work with and motivate people, and organize and direct large-scale activities. They also should enjoy public speaking.

Health administrators advance in the profession by taking increasingly more responsible positions. For example, some hospital administrators begin their careers in small hospitals in positions with broad responsibilities, such as assistant administrator. They advance by moving to jobs as associate or chief administrator in larger hospitals. More commonly, they start in a large institution in a position that is somewhat narrow in scope—for example, as department head in charge of purchasing. Regardless of the path of advancement chosen, the ultimate occupational goal in hospitals and nursing homes is the job of chief executive or chief administrative officer.

Employment Outlook

The number of graduate programs in health administration has increased rapidly in recent years and administative specialists with graduate degrees in other fields also have entered the profession. Consequently, it may become more difficult for those with less than graduate education to enter health administration in top management positions. In addition, some administrative jobs will continue to be filled by registered nurses, physicians, and members of religious communities.

Employment of health services administrators is expected to grow much faster than the average for all occupations to 1985 as the quantity of patient services increases and health services management becomes more complex. The demand for administrators will be stimulated by the formation of more group medical practices and health maintenance organizations (facilities that offer subscribers a broad range of medical services for a monthly fee paid in advance). Administrators also will be needed in nursing and convalescent homes to handle the increasing amount of administrative work expected as these facilities expand in size.

Earnings and Working Conditions

Salaries of hospital administrators depend on factors such as the level of job responsibility; the size, type, and location of the hospital; and the size of its administrative staff and budget.

Chief administrators in hospitals with up to 199 beds earned an average of $25,500 a year in 1976. Some, in larger hospitals, earned over $45,000. Recent recipients of master's degrees in health administration starting work in Veterans Administration (VA) hospitals earned $14,097 a year in 1977. The average salary paid administrators of Federal hospitals was $26,700.

Commissioned officers in the Armed Forces who work as hospital administrators hold ranks ranging from second lieutenant to colonel or from ensign to captain. Commanding officers of large Armed Forces hospitals are generally physicians, who may hold higher ranks. Hospital administrators in the U.S. Public Health Service are commissioned officers holding ranks ranging from lieutenant (junior grade) to captain in the Navy.

Administrators of nursing and personal care homes usually earn lower salaries than those paid hospital administrators in facilities having similar numbers of beds. Most administrators employed by voluntary health agencies earned between $15,000 and $30,000 a year in 1976.

Health administrators often work long hours. Because health facilities such as nursing homes and hospitals operate around the clock, administrators in these institutions may be called at all hours to settle emergency problems. Also, some travel may be required to attend meetings or, in the case of regional, State or local public health department and voluntary health agency administrators, to inspect facilities in the field.

Sources of Additional Information

Information about health administration and the academic programs in this field offered by universities, colleges, and community colleges is available from:

American College of Hospital Administration, 840 North Lake Shore Drive, Chicago, Illinois 60611.

Association of University Programs in Health Administration, One Dupont Circle, NW., Washington, D.C. 20036.

American Public Health Association, Division of Program Services, 1015 18th St., NW., Washington, D.C. 20036.

National Health Council, Health Careers Program, 1740 Broadway, New York, N.Y. 10019.

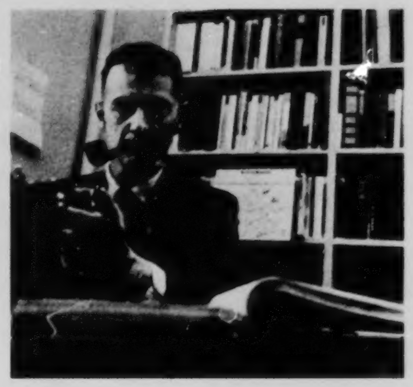
American College of Nursing Home Administrators, 4650 East-West Hwy., Washington, D.C. 20014.

HISTORIANS

(D.O.T. 052.038 and .088)

Nature of the Work

History is the record of past events, institutions, ideas, and people. Historians describe and analyze the past through writing, teaching, and research. They relate their knowledge of the past to current events in an effort to explain the present.



Colleges and universities employ about 70 percent of all historians.

Historians may specialize in the history of a specific country or area, or era—ancient, medieval, or modern. They also may specialize in the history of a field, such as economics, medicine and disease, philosophy, religion, science, culture, military affairs, the labor movement, art, or architecture. Other specialties are concerned with historic preservation, women, business, archives, quantitative analysis, and the relationship between technological and other aspects of historical development.

In this country, many historians specialize in the social or political history of either the United States or modern Europe; however, a growing number are specializing in African, Latin American, Asian, or Near Eastern history. Some historians specialize in phases of a larger historical field, such as the American Civil War.

Most historians work in colleges and universities and are primarily concerned with teaching. They often lecture, write, and do research outside the academic setting. Other historians employed in colleges and universities are involved in research and development, administration, and other non-teaching activities. Some specialists, called *archivists*, work for museums, special libraries, historical societies, and other organizations. They collect historical documents and objects, prepare historical exhibits, and edit and classify historical materials for use in research and other activities. A growing number of historians are concerned with the interpretation and preservation of historic buildings, treasures, documents, and other items. A few serve as consultants to editors, publishers, and producers of materials for radio, television, and motion pictures. Some historians are administrators in government or researchers who prepare studies, articles, and books on their findings.

Places of Employment

An estimated 22,500 persons worked as professional historians in 1976, excluding those teaching in secondary schools. Colleges and universities employ about seventy percent of all historians. Historians also work in archives, libraries, museums, research organizations, historical societies, publishing firms, large corporations, and government agencies. Historians employed in the Federal Government work principally in the National Archives, Smithsonian Institution, or in the Departments of Defense, Interior, and State. Other Federal agencies that employ historians include the National Aeronautics and Space Administration, Central Intelligence Agency, National Security Agency, and the Departments of Agriculture, Commerce, Transportation, and Health, Education and Welfare. A small but growing number work for State and local governments.

Historians are employed in virtually all U.S. institutions of higher education. Most historians who work for the Federal Government are in Washington, D.C. Historians in other types of employment usually work in localities having museums or libraries with collections adequate for historical research.

Training, Other Qualifications, and Advancement

Graduate education usually is necessary for employment as a historian. A master's degree in history is the minimum requirement for the position of college instructor. A Ph. D. degree usually is required for a professorship and for administrative positions, and almost always is necessary to gain tenure.

While historians in the Federal Government generally must have 24 semester hours in history, requirements may vary for certain specialists such as archivists, who usually must have 30 hours of graduate work in history. Most historians in the Federal Government and in nonprofit organizations have Ph. D. degrees, or their equivalent in training and experience.

Although a bachelor's degree with a major in history is sufficient training for some beginning jobs in government— either Federal, State, or local— advancement opportunities may be limited for persons without at least a master's and preferably a Ph. D. degree in history. Since beginning jobs are likely to be concerned with collection and preservation of historical data, a knowledge of archival work is helpful.

Training for historians is available in many colleges and universities. Over 1,250 schools offer programs for the bachelor's degree; about 440, the master's; and about 145, doctorates.

History curriculums in the Nation's colleges and universities are varied; however, each basically provides training in research methods, writing, and speaking. These are the basic skills essential for historians in all positions. Quantitative methods of analysis, including statistical and computer techniques, are increasingly important for historians; many college programs include them. Most doctoral candidates must exhibit competence in a foreign language.

Historians spend a great deal of time studying, doing research, writing papers and reports, and giving lectures and presentations. Therefore, they must possess analytical skills and the ability to communicate their ideas effectively, orally and in writing. The ability to work both independently and as part of a group also is essential.

Employment Outlook

Employment of historians is expected to grow more slowly than the average for all occupations through the mid-1980's. Job openings will result chiefly from deaths, retirements, and other separations from the labor force.

Only a small number of historians will be needed to fill positions in colleges and universities, junior colleges, libraries, archives, museums, secondary schools, research organizations, publishing firms, and government agencies. Persons with training in historical specialties such as historic preservation and business history, in addition to those well-trained in quantitative methods in historical research are expected to have the most favorable job opportunities. Those who are able to teach several areas of history should have the best opportunities for jobs in colleges and universities.

Although information is limited on patterns of entry to the field, it is clear that the number of persons seeking to enter the occupation will greatly exceed available positions. As a result, historians with a Ph. D. are expected to face keen competition for positions through the mid-1980's. Those graduating from prestigious universities should have some advantage in this highly competitive situation. Since academic institutions are the traditional employers of many highly qualified historians and competition for these jobs is expected to be particularly keen, many Ph. D.'s are expected to accept part-time, temporary assignments as instructors with little or no hope of gaining tenure. Persons with the master's degree in history will encounter very keen competition for jobs as historians. However, some of them will find teaching positions in community and junior colleges or high schools; such jobs may have State certification requirements.

People with a bachelor's degree in history are likely to find very limited opportunities for employment as professional historians. However, an undergraduate major in history provides an excellent background for some jobs in international relations, journalism, and other areas, and for continuing education in law, business adminstration, and related disciplines. Many graduates will find jobs in secondary schools or in government, business, and industry as management or sales trainees, or as research or administrative assistants.

Earnings

According to the 1975-76 College Placement Council Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,000 a year; master's degree candidates in the social sciences, around $12,000.

According to information from the American Historical Association, large public colleges and universities offered starting salaries ranging from about $13-$15,000 for academic year 1975-76. Smaller public and private academic institutions generally offered lower salaries. Full professors and top administrators may earn $25-$30,000 a year or more. In general, salaries of experienced historians are higher than the average for all nonsupervisory workers in private industry, except farming.

The Civil Service Commission recognizes education and experience in certifying applicants for entry level positions in the Federal Government. In general, historians having a bachelor's degree could start at $9,303 or $11,523 a year in 1977, depending upon the applicant's academic record. Starting salaries for those having a master's degree were $14,097 a year, and for those having a Ph. D., $17,056. Historians and archivists in the Federal Government averaged around $22,400 a year in 1977.

Many historians, particularly those in college teaching, supplement their income by teaching summer classes, writing books or articles, or giving lectures.

Sources of Additional Information

Additional information on careers and job openings for historians, and on schools offering various programs in history, is available from:

American Historical Association, 400 A St.
SE., Washington, D.C. 20003.

For information on careers and schools offering programs in historic preservation, contact:

National Trust for Historic Preservation, 740
Jackson Place, N.W., Washington, D.C.
20006.

Additional information on nonteaching opportunities for historians is available from:

Organization of American Historians, Indiana
University, 112 North Bryan St., Bloomington, Ind. 47401.

HOME ECONOMISTS

(D.O.T. 096.128)

Nature of the Work

Home economists work to improve products, services, and practices that affect the comfort and well-being of the family. Some specialize in specific areas, such as consumer economics, housing, home management, home furnishings and equipment, food and nutrition, clothing and textiles, and child development and family relations. Others have a broad knowledge of the whole professional field.

Most home economists teach. Those in high schools teach students about foods and nutrition; clothing selection, construction and care; child development; consumer education; housing and home furnishings; family relations; and other subjects related to family living and homemaking. They also perform the regular duties of other high school teachers that are described in the statement on secondary school teachers elsewhere in the *Handbook*.

Teachers in adult education programs help men and women to increase their understanding of family relations and to improve their homemaking skills. They also conduct training programs on secondary, postsecondary, and adult levels for jobs related to home economics. Special emphasis is given to teaching those who are disadvantaged and handicapped. College teachers may combine teaching and research and often specialize in a particular area of home economics.

Home economists employed by private business firms and trade associations promote the development, use, and care of specific home products. They may do research, test products, and prepare advertisements and instructional materials. They also may prepare and present programs for radio and television; serve as consultants; give lectures and demonstrations before the public; and conduct classes for sales persons and appliance service workers. Some home economists study consumer needs and help manufacturers translate these needs into useful products.

Some home economists conduct research for the Federal Government, State agricultural experiment stations, colleges, universities, and private organizations. The U.S. Department of Agriculture employs the largest group of researchers to do work such as study the buying and spending habits of families in all socioeconomic groups and develop budget guides.

Home economists who work for the Cooperative Extension Service conduct adult education programs and 4-H Club and other youth programs in areas such as home management, consumer education, family relations, and nutrition. Extension Service home economists also train and supervise volunteer leaders and paid aides who teach adults and youth. (See statement on Cooperative Extension Service workers elsewhere in the *Handbook*.)

Federal, State, and local governments and private agencies employ home economists in social welfare programs to advise and counsel clients on the practical knowledge and skills needed for effective everyday family living. They also may help handicapped homemakers and their families adjust to physical as well as social and emotional limitations by changing the arrangements in the home; finding efficient ways to manage activities of daily living; aiding in the design, selection, and arrangement of equipment; and creating other methods and devices to enable disabled people to function at their highest possible level. Other home economists in welfare agencies supervise or train workers who provide temporary or part-time help to households disrupted by illness.

Home economists in health services provide special help and guidance in home management, consumer education, and family economics as these relate to family health and well-being. Activities of home economists working in health programs include the following: collaboration and consultation with other professionals on economic and home management needs of patients and their families; direct service to patients through home visits; clinic demonstrations and classes in homemaking skills and child care; counseling in the management of time and resources, including financial aspects; assisting socially and mentally handicapped parents in developing their potential skills for child care and

Some home economists work with children.

home management; working with agencies and community resources; and supervising homemaker aides.

Places of Employment

About 141,000 people worked in home economics professions in 1976. This figure includes 45,000 dietitians and 5,600 Cooperative Extension Service workers who are discussed in separate statements elsewhere in the *Handbook*.

About 75,000 home economists are teachers, about 50,000 in secondary schools and 7,000 in colleges and universities. More than 15,000 are adult education instructors, some of whom teach part time in secondary schools. Others teach in community colleges, elementary schools, kindergartens, nursery schools, and recreation centers.

More than 5,000 home economists work in private business firms and associations. Several thousand are in research and social welfare programs. A few are self-employed.

Training, Other Qualifications, and Advancement

About 350 colleges and universities offer a bachelor's degree in home economics, which qualifies graduates for most entry positions in the field. A master's or doctor's degree is required for college teaching, for certain research and supervisory positions, for work as an extension specialist, and for most jobs in nutrition.

Home economics majors study sciences and liberal arts—particularly social sciences—as well as specialized home economics courses. They may concentrate in a particular area of home economics or in what is called general home economics. Advanced courses in chemistry and nutrition are important for work in foods and nutrition; science and statistics for research work; and journalism for advertising, public relations work, and all other work in the communications field. To teach home economics in high school, students must complete the courses required for a teacher's certificate.

Scholarships, fellowships, and assistantships are available for undergraduate and graduate study. Although colleges and universities offer most of these financial grants, government agencies, research foundations, businesses, and the American Home Economics Association Foundation provide additional funds for graduate study.

Home economists must be able to work with people of various incomes and cultural backgrounds and should have a capacity for leadership. Poise and an interest in people also are essential for those who deal with the public. The ability to write and speak well is important. Among the subjects recommended for high school students interested in careers in this field are home economics, speech, English, health, mathematics, chemistry, and the social sciences.

Employment Outlook

Home economists, especially those wishing to teach in high schools, will face keen competition for jobs through the mid-1980's. Other areas of home economics also will experience competitive job market conditions as those unable to find teaching jobs look for other positions. However, for those willing to continue their education toward an advanced degree, employment prospects in college and university teaching are expected to be good.

Although little change is expected in the employment of home economists, many jobs will become available each year to replace those who die, retire, or leave the field for other reasons. The growth that is expected to occur will result from increasing awareness of the contributions that can be made by home economists in child care, nutrition, housing and furnishings design, clothing and textiles, consumer education, and ecology. They also will be needed to promote home products, to act as consultants to consumers, and to do research for improvement of home products and services.

Earnings and Working Conditions

Home economics teachers in public schools generally receive the same salaries as other teachers. In 1976, the average annual salary for public secondary school teachers was $12,395, according to the National Education Association. Teachers with a bachelor's degree in school systems with enrollments of 6,000 or more received starting salaries averaging $8,233 per year in the 1974-75 school year. Beginning teachers with a master's degree started at $9,159 a year. Annual salaries for teachers at the college and university level in 1975-76 ranged from an average minimum of $7,272 for instructors in private 2-year institutions to an average maximum of $25,387 for professors at 4-year public institutions.

The Federal Government paid home economists with bachelor's degrees starting salaries of $9,300 and $11,500 in 1977, depending on their scholastic record. Those with additional education and experience generally earned from $11,500 to $20,400 or more, depending on the type of position and level of responsibility. In 1977, the Federal Government paid experienced home economists average salaries of $20,500 a year.

Cooperative Extension Service workers on the county level averaged $14,000 per year in 1976; those on the State level received substantially higher salaries. In general, home economists earn about 1 1/2 times as much as the average for all nonsupervisory workers in private industry, except farming.

Home economists usually work a 40-hour week. Those in teaching and extension service positions, however, frequently work longer hours because they are expected to be available for evening lectures, demonstrations, and other work. Most home economists receive fringe benefits, such as paid vacation, sick leave, retirement pay, and insurance benefits.

Sources of Additional Information

A list of schools granting degrees in home economics and additional information about home economics careers and graduate scholarships are available from:

American Home Economics Association,
2010 Massachusetts Ave. NW., Washington, D.C. 20036

HOTEL MANAGERS AND ASSISTANTS

(D.O.T. 163.118 and 187.118, .168)

Nature of the Work

Hotel managers are responsible for operating their establishments profitably and satisfying guests. They determine room rates and credit policy, direct the operation of the kitchen and dining rooms, and manage the housekeeping, accounting, and maintenance departments of the hotel. Handling problems and coping with the unexpected is an important part of the job.

Managers who work in small hotels may do much of the front office clerical work, such as taking room reservations and assigning rooms. In some small hotels and many motels, the manager is also the owner and may be responsible for all aspects of the business.

General managers of large hotels usually have several assistants who manage various parts of the operation. Because the hotel restaurant and cocktail lounge are important to the success of the entire establishment, they almost always are operated by managers with experience in the restaurant field. Other areas that usually are handled separately are advertising, rental of banquet and meeting facilities, personnel, and accounting.

Large hotel and motel chains often centralize some activities, such as purchasing and advertising, so that individual hotels in the chain may not need managers for these departments. Managers who work for chains may be assigned to organize a newly built or purchased hotel or to reorganize an existing hotel or motel that is not operating successfully.

General managers of large hotels usually have several assistants who manage various parts of the operation.

About 137,000 hotel and motel managers worked in 1976. More than a third were self-employed.

Training, Other Qualifications, and Advancement

Experience generally is the most important consideration in selecting managers. However, employers increasingly are emphasizing college education. A bachelor's degree in hotel and restaurant administration provides particularly strong preparation for a career in hotel management. In 1976, about 30 colleges and universities offered 4-year programs in this field. However, applicants to these programs may face increasing competition in the coming years. The courses in hotel work that are available in many junior colleges and technical institutes and through the American Hotel and Motel Association also provide a good background.

A college program in hotel management usually includes courses in hotel administration, accounting, economics, data processing, food service management and catering, and hotel maintenance engineering. Students are encouraged to work in hotels or restaurants during summer vacations because the experience gained and the contacts made with employers may help them to get better hotel jobs after graduation.

Managers should have initiative, self-discipline, and the ability to organize work and direct the work of others. They must be able to concentrate on details and solve problems.

Some large hotels have special on-the-job management trainee programs in which trainees rotate among various departments to acquire a thorough knowledge of the hotel's operation. Outstanding employees who have not had college training may receive financial assistance to help them acquire a degree.

Most hotels promote employees with proven ability, usually front office clerks, to assistant manager and eventually to general manager. Newly built hotels, particularly those without well-established on-the-job training programs, often prefer experienced personnel for managerial positions. Hotel chains may offer better opportunites for advancement than independent hotels, because employees can transfer to another hotel in the chain or to the central office if an opening occurs.

Employment Outlook

Employment of hotel managers is expected to grow more slowly than the average for all occupations through the mid-1980's. Some job openings will occur as additional hotels and motels are built and chain and franchise operations spread. However, most openings will occur as experienced managers die, retire, or leave the occupation. Applicants having college degrees in hotel administration will have an advantage in seeking entry positions and later advancement.

See the statement on the Hotel Industry elsewhere in the *Handbook* for information on earnings and working conditions, sources of additional information, and more information on employment outlook.

INDUSTRIAL DESIGNERS

(D.O.T. 142.081)

Nature of the Work

When people buy a product, whether it's a home appliance, a new car, or a ball point pen, they want it to be as attractive, safe, and easy to use as possible. Industrial designers combine artistic talent with knowledge of marketing, materials, and methods of production to improve the appearance and functional design of products so that they compete favorably with similar goods on the market.

As the first step in their work, industrial designers compare the prod-

Industrial designers confer on plans for new product.

uct with competing products, and gather information about such things as the needs of the user of the product, fashion trends, and effects of the product on its environment. After the initial research, industrial designers sketch different designs and consult with engineers, production supervisors, and sales and market research personnel about the practicability and sales appeal of each idea. Teamwork is important to get the best information about specialized areas of concern, such as engineering problems or new production or marketing methods.

After company officials select the most suitable design, the industrial designer or a professional modeler makes a model, often of clay so that it can be easily changed. After any necessary revisions, a final or working model is made, usually of the material to be used in the finished product. The approved model then is put into production.

Although most industrial designers are product designers, many others employed by business organizations are involved in different facets of design. Some industrial designers seek to create favorable public images for companies and for government services such as transportation by developing trademarks or symbols that appear on the firm's product, advertising, brochures, and stationery. Some design containers and packages that both protect and promote their contents. Others prepare small display exhibits or the entire layout for industrial fairs. Some design the interior layout of special purpose commercial buildings such as restaurants and supermarkets.

Corporate designers employed by a manufacturing company usually work only on the products made by their employer. This may involve filling day-to-day design needs of the company or long-range planning of new products. Consultant designers who serve more than one industrial firm often plan and design a great variety of products.

Places of Employment

About 12,000 persons were employed as industrial designers in 1976. Most worked for large manufacturing companies designing either consumer or industrial products or for design consulting firms. Others did freelance work, or were on the staffs of architectural and interior design firms. A few taught industrial design in colleges, universities, and art schools.

Industrial design consultants work mainly in large cities such as New York, Chicago, Los Angeles, and San Francisco. Industrial designers with industrial firms usually work in or near the manufacturing plants of their companies, which often are located in small and medium-sized cities.

Training, Other Qualifications, and Advancement

Completing a course of study in industrial design in an art school, in the design or art department of a university, or in a technical college is the usual requirement for entering this field of work. Persons majoring in engineering, architecture, and fine arts may qualify as industrial designers if they have appropriate experience and artistic talent. Most large manufacturing firms hire only industrial designers who have a bachelor's degree in the field.

In 1976, 33 colleges and art schools offered programs in industrial design that were either accredited by the National Association of Schools of Art or recognized by the Industrial Designers Society of America.

Industrial design programs may take either 4 or 5 years, and lead to a bachelor's degree in industrial design or fine arts. Some schools require applicants to submit sketches and other examples of their artistic ability for prior approval. Some schools also award a master's degree in industrial design.

Industrial design programs differ considerably among schools. Most college and university programs maintain a balance between science, humanities, and art; art schools generally stress a strong foundation in art. In most programs, students spend much time in the lab designing objects in three dimensions. In studio courses, students make models with clay, wood, plaster, and other easily worked materials. In schools that have the necessary machinery, students make models of their designs while learning to use metalworking and woodworking machinery. Students also take courses in drawing, drafting, and other visual communications skills.

Many industrial design programs, particularly those that are part of a liberal arts college or university, also include courses in basic engineering, in the physical and natural sciences, in the behavioral sciences, and in marketing and business administration.

Industrial designers must have creative talent, drawing skills, and the ability to see familiar objects in new ways. They must understand and meet the needs and tastes of the public, rather than design only to suit their own artistic sensitivity. Designers should not be discouraged when their ideas are rejected—often designs must be resubmitted many times before one is accepted. Since industrial designers must cooperate with engineers and other staff members, the ability to work and communicate with others is important. A sound understanding of marketing, sales work, and other business practices is important for design consultants.

Applicants for jobs should assemble a "portfolio" of drawings and sketches to demonstrate their creativity and ability to communicate ideas.

New graduates of industrial design programs frequently do simple assignments for experienced designers. As they gain experience, they may become supervisors with major responsibility for the design of a product or a group of products. Those who have an established reputation and the necessary funds may start their own consulting firms.

Employment Outlook

Employment in this relatively small occupation is expected to grow more slowly than the average for all occupations. In recent years, the trend has been away from frequent redesign of household products, automobiles, and industrial equipment. However, continued emphasis on issues such as ecology and product safety should increase demand for industrial designers.

Demand for industrial designers may fluctuate over short-run periods. During economic downturns when the market for new products is dampened, the need for these workers also tends to decline.

Employment opportunities are expected to be best for college graduates with degrees in industrial design. In addition to openings resulting from growth, some employment opportunities will arise each year as designers die, retire, or transfer to other fields.

Earnings and Working Conditions

Salaries for inexperienced industrial designers with a bachelor's degree generally ranged from $9,000 to $12,000 a year in 1976, according to limited data. After several years' experience, it is possible to earn $14,000 to $18,000 a year. Salaries of those with many years of experience averaged more than $25,000 a year in 1976, but varied according to individual talent and the size and type of firm.

Earnings of industrial designers who own their consulting firms fluctuate greatly, but in general tend to be higher than the average earnings of corporate industrial designers.

Industrial designers generally work a 5-day, 35-40 hour week, with occasional overtime necessary to meet production deadlines. Independent consultants, who often are paid by the assignment, may work longer hours.

Sources of Additional Information

A brochure about careers and a list of schools offering courses and degrees in industrial design are available for 50 cents from:

Industrial Designers Society of America, 1750 Old Meadow Rd., McLean, Va. 22101.

INDUSTRIAL TRAFFIC MANAGERS

(D.O.T. 184.168)

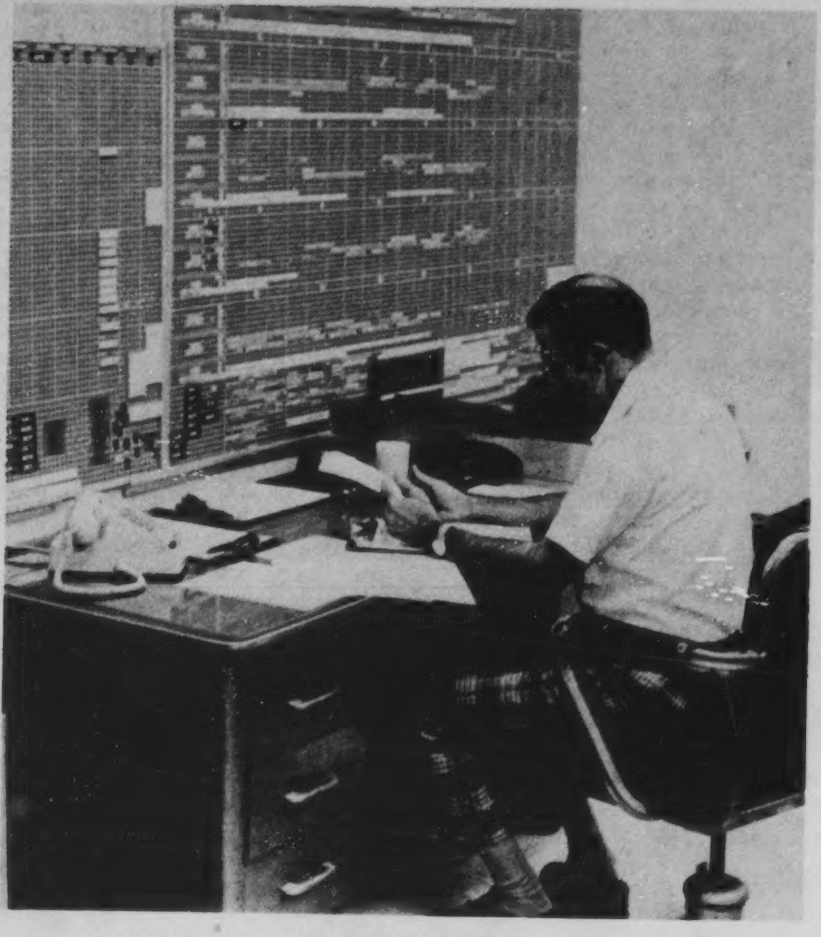
Nature of the Work

Industrial firms want to receive raw materials and deliver customers' goods promptly, safely, and with minimum cost. Arranging for the transportation of materials and finished products is the job of an industrial traffic manager. Industrial traffic managers analyze various transportation possibilities and choose the most efficient type for their companies' needs—rail, air, road, water, pipeline, or some combination. Then they select the route and the particular carrier. To make their decision, traffic managers consider factors such as freight classifications and regulations, freight charges, time schedules, size of shipments, and loss and damage ratios. (This statement does not cover traffic managers who sell transportation services for railroads, airlines, trucking firms, and other freight carriers.)

Activities of industrial traffic managers range from checking freight bills to deciding whether the company should buy its own fleet of rail cars or trucks or contract for services. They route and trace shipments, arrange with carriers for transportation services, prepare bills of lading and other shipping documents, and handle claims for lost or damaged goods. Traffic managers keep records of shipments, freight rates, commodity classifications, and applicable government regulations. They also must stay informed about changing transportation technology.

Traffic managers often consult with other company officials about the firm's transportation needs. They may, for example, work with production department personnel to plan shipping schedules, or with members of the purchasing department to determine what quantities of goods can be transported most economically.

Since many aspects of transportation are subject to Federal, State, and local government regulations, traffic managers must know about these and any other legal matters that apply to



Industrial traffic managers arrange the transportation of materials and finished products.

their companies' shipping operations. High level traffic managers represent their companies before ratemaking and regulatory bodies such as the Interstate Commerce Commission, State commissions, and local traffic bureaus.

Places of Employment

More than 21,000 persons were involved in industrial traffic management in 1976. Although most jobs are found in manufacturing firms, some traffic managers work for wholesalers or for large retail stores. Some traffic managers work for consulting firms that handle transportation problems for clients; a few run their own consulting businesses.

Training, Other Qualifications, and Advancement

Although high school graduates with experience in traffic departments sometimes are hired as traffic managers, a college education is increasingly important in this field. For some kinds of work, college training is required. To argue cases before the Interstate Commerce Commission, for example, a traffic manager must meet standards that include at least 2 years of college. Some employers prefer graduates of technical and trade school programs in traffic management. Others seek college and university graduates who have either majored, or taken courses, in transportation, logistics, physical distribution, management, economics, statistics, marketing, computer science, and commercial law.

Industrial traffic training is available through colleges and universities, technical and trade schools, and seminars sponsored by professional associations. More than 100 colleges and universities offer programs or courses in traffic management. College courses in this field often are offered as part of a major program in business administration. In some colleges and universities, however, traffic management is taught in departments of logistics, transportation, or marketing and distribution. In addition to degree programs at the associate, baccalaureate, and graduate levels, a number of colleges and universities offer workshops, seminars, and other short-term programs in transportation and traffic management.

Industrial traffic managers should be able to analyze numerical and technical data such as freight rates and classifications to solve transportation problems. The job also requires the ability to work independently and to present facts and figures in a convincing manner.

Newly hired traffic specialists often complete shipping documents and calculate freight charges. After gaining experience, they do more technical work such as analyzing transportation statistics. A competent worker may advance to a supervisory job such as supervisor of rates and routes; a few are promoted to assistant traffic manager and eventually to traffic manager. Industrial traffic managers can sometimes help their chances for advancement by participating in company-sponsored training programs or taking advanced courses in traffic management. A growing number are certified by the American Society of Traffic and Transportation, Inc.

Employment Outlook

Industrial traffic management is a relatively small occupation and is expected to grow about as fast as the average for all occupations through the mid-1980's. Openings will occur each year as new jobs are created, and as traffic managers die, retire, or leave the field for other reasons. College graduates with a major in traffic management or transportation can expect first consideration for the available jobs.

Growth in the occupation will stem from an increasing emphasis on reducing the cost of receiving raw materials and distributing finished products. As the distance between markets becomes greater and rate schedules and regulations governing transportation more complex, manufacturers increasingly will require the expertise of the traffic manager.

Earnings and Working Conditions

Industrial traffic specialists' salaries started at about $11,000 a year in 1976, according to the limited information available. Although earnings of experienced traffic managers vary, in general they are much higher than the average for all nonsupervisory workers in private industry, except farming. Some traffic executives earned $50,000 a year or more.

Although industrial traffic managers usually have a standard workweek, some of them have to spend time outside regular working hours preparing reports, attending meetings, and traveling to hearings before State and Federal regulatory agencies.

Sources of Additional Information

Answers to specific questions about a career in traffic management are available from:

American Society of Traffic and Transportation, Inc., 547 West Jackson Blvd., Chicago, Ill. 60606.

For a list of colleges, universities, and technical institutes that offer instruction in transportation and related areas, see: *Directory of Transportation Education*, published in 1976 by the U.S. Department of Transportation (Washington, D.C., U.S. Government Printing Office). The directory is available in many school and public libraries.

For a copy of the American Trucking Association's *Directory of Transportation Education in U.S. Colleges and Universities*, write:

American Trucking Associations, Inc., 1616 P St. NW., Washington, D.C. 20036.

For information on proprietary schools that offer programs in traffic management, contact:

National Association of Trade and Technical Schools, 2021 L St. NW., Washington, D.C. 20036.

INSURANCE AGENTS AND BROKERS

(D.O.T. 250.258)

Nature of the Work

Insurance agents and brokers sell policies that protect individuals and businesses against future losses and financial pressures. They may help plan financial protection to meet the special needs of a customer's family; advise about insurance protection for an automobile, home, business, or other property; or help a policyholder obtain settlement of an insurance claim.

Agents and brokers usually sell one or more of the three basic types of insurance: life, property-liability (casualty), and health. Life insurance agents, sometimes called life underwriters, offer policies that pay survivors when a policyholder dies. Depending on the policyholder's individual circumstances, a life policy can be designed to provide retirement income, funds for the education of children, or other benefits. Casualty insurance agents sell policies that protect individual policyholders from financial losses as a result of automobile accidents, fire or theft, or other losses. They also sell industrial or commercial lines, such as workers' compensation, product liability, or medical malpractice insurance. Health insurance policies offer protection against the costs of hospital and medical care or loss of income due to illness or injury, and many life and casualty agents offer health insurance in addition to other lines. Many agents also offer securities, such as mutual fund shares or variable annuities.

An insurance agent may be either an insurance company employee or an independent business person authorized to represent one insurance company or more. Brokers are not under exclusive contract with any single company; instead, they place policies directly with the company that best meets a client's needs. Otherwise, agents and brokers do much the same kind of work.

They spend most of their time discussing insurance needs with prospective and existing customers. Some time must be spent in office work to prepare reports, maintain

Insurance agents plan insurance programs that are tailored to prospects' needs.

records, plan insurance programs that are tailored to prospects' needs, and draw up lists of prospective customers. Specialists in group policies may help an employer's accountants set up a system of payroll deductions for employees covered by the policy.

Places of Employment

About 465,000 agents and brokers sold insurance full time in 1976. In addition, thousands of others worked part time. About half of the agents and brokers specialized in life insurance; the rest, in some type of property/liability insurance. A growing number of agents (called multi-line agents) offer both life and property-liability policies to their customers.

Agents and brokers are employed in cities and towns throughout the country, but most work near large population centers.

Training, Other Qualifications, and Advancement

Although many employers prefer college graduates for jobs selling insurance, most will hire high school graduates with potential or proven sales ability. College training may help the agent grasp the fundamentals and procedures of insurance selling more quickly. Courses in accounting, economics, finance, business law, and insurance subjects are helpful.

All agents and most brokers must obtain a license in the State where they plan to sell insurance. In most States, licenses are issued only to applicants who pass written examinations covering insurance fundamentals and the State insurance laws. Agents who plan to sell mutual fund shares and other securities also must be licensed by the State. New agents usually receive training at the agencies where they will work and frequently also at the insurance company's home office. Beginners sometimes attend company-sponsored classes to prepare for examinations. Others study on their own and accompany experienced sales workers when they call on prospective clients.

Agents and brokers can broaden their knowledge of the insurance business by taking courses at colleges and universities and attending institutes, conferences, and seminars sponsored by insurance organizations. The Life Underwriter Training Council (LUTC) awards a diploma in life insurance marketing to agents who successfully complete the Council's 2-year life program. There is also a course in health insurance. As agents or brokers gain experience and knowledge, they can qualify for the Chartered Life Underwriter (CLU) designation by passing a series of examinations given by the American College of Bryn Mawr, Pa. In much the same way, a property-liability agent can qualify for the Chartered Property Casualty Underwriter (CPCU) designation by passing a series of examinations given by the American Institute for Property and Liability Underwriters. The CLU and CPCU designations are recognized marks of achievement in their respective fields.

Agents and brokers should be enthusiastic, self-confident, and able to communicate effectively. Because agents usually work without supervision, they need initiative to locate new prospects. For this reason, many employers seek people who have been successful in other jobs.

Insurance agents who show unusual sales ability and leadership may become a sales manager in a local office or assume a managerial job in a home office. A few agents may advance to top positions as agency superintendents or company vice-presidents. Many who have built up a good clientele prefer to remain in saleswork. Some, particularly in the property-liability field, eventually establish their own independent agencies or brokerage firms.

Employment Outlook

Employment of insurance agents and brokers is expected to grow about as fast as the average for all occupations through the mid-1980's as the volume of insurance sales continues to expand. Many additional jobs will open as agents and brokers die, retire, or leave their jobs to seek other work. Due to the highly competitive nature of insurance selling, many beginners leave the field because they are unable to establish a sufficiently large clientele. Therefore, opportunities should be quite favorable for ambitious people who enjoy saleswork.

Future demand for agents and brokers depends on the volume of insurance sales. Volume should increase rapidly over the next decade as a larger proportion of the population enters the period of peak earnings and family responsibilities. Life insurance sales should grow as more families select policies designed to provide educational funds for their children and retirement income. Rising incomes also may stimulate the sales of equity products such as mutual funds, variable annuities, and other investments. Sales of property-liability insurance should rise as more consumer purchases are insured and as complex types of commercial coverage, such as product liability and workers'compensation, are expanded.

However, employment of agents and brokers will not keep pace with the rising level of insurance sales because more policies will be sold to groups and by mail. In addition, each agent should be able to handle more business as computers take over some of the time-consuming clerical tasks. The trend toward multi-line agents also will cause employment to rise more slowly than the volume of insurance sales.

Earnings and Working Conditions

Beginners in this occupation often are guaranteed a moderate salary while they are learning the business and building a clientele. In many large companies, new agents receive about $800 a month during this training period, which can last up to 6 months or longer. Thereafter, most agents are paid on a commission basis. The size of the commission depends on the type and amount of insurance sold, and whether the transaction is a new policy or a renewal. After a few years, an agent's commissions on new policies and renewals may range from $12,000 to $20,000 annually. There is virtually no limit on what an agent can earn, however. Thousands of established agents and brokers earn more than $30,000 a year, and many highly successful ones earn more than $100,000 a year.

Agents and brokers generally pay their own automobile and traveling expenses. In addition, those who own and operate independent businesses must pay office rent, clerical salaries, and other operating expenses out of their earnings.

Although insurance agents usually are free to arrange their own hours of work, they often schedule appointments during evenings and weekends for the convenience of clients. Some agents work more than the customary 40 hours a week. (See the statement on the Insurance Industry for more information about work in life and property-liability companies.)

Sources of Additional Information

General occupational information about insurance agents and brokers is available from the home office of many life and property-liability insurance companies. Information on State licensing requirements may be obtained from the department of insurance at any State capital.

Information about a career as a life insurance agent also is available from:

American Council of Life Insurance, 1850 K St., NW., Washington, DC, 20006.

The National Association of Life Underwriters, 1922 F St., NW., Washington, D.C. 20006.

For career information on property/liability agents, contact:

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

National Association of Insurance Agents, Inc., 85 John St., New York, N.Y. 10038.

American Mutual Insurance Alliance, 20 N. Wacker Dr., Chicago, Ill. 60606.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

INTERIOR DESIGNERS

(D.O.T. 142.051)

Nature of the Work

The creative work of interior designers, sometimes called *interior decorators*, helps make our living, working, and playing areas more attractive and useful. Interior designers plan and supervise the design and arrangement of building interiors and furnishings. They may work on either private homes or commercial buildings.

When planning a room, designers first consider the purpose of the area and the client's budget and taste. A very expensive couch that is easily soiled, for example, may not suit a family's needs for their recreation room.

Next, most designers prepare sketches of their plans. The sketches show all the furniture and accessories the designer is considering as well as any changes in the structure itself, such as a new wall to separate the dining and living rooms. Sometimes, the clients may not like the plans, in which case the designer must start all over again; other times, the client may want to make only minor changes, such as putting a table and chair where the designer had placed a couch.

Once the client approves both the plans and the cost, the designer may look for and then buy the furnishings, supervise the work of painters, floor finishers, carpet layers, and other craft workers if they are needed, and make sure the furnishings are installed and arranged properly.

Designers who work in large department and furniture stores that have separate design departments advise customers on decorating and design plans. Although their principal function is to help sell the store's merchandise, they sometimes may suggest furnishings from other sources when essential to the customer's plans. Department store designers also frequently advise the

A successful designer must be creative, have good color sense and good taste, and be able to work well with people.

store's buyers and executives about style and color trends in interior furnishings.

Interior designers who specialize in nonresidential structures often work for clients on large design projects such as the interiors of entire office buildings, hospitals, and libraries. Generally they plan the complete layout of rooms without changes to the structure of the building. Sometimes, though, they redesign or renovate the interiors of old buildings. In these cases, an architect checks the plans to make sure that they comply with building requirements. Some interior designers also design the furniture and accessories to be used in various structures, and then arrange for their manufacture. A few have unusual jobs such as designing interiors of ships and aircraft or stage sets used for motion pictures or television.

All designers, regardless of where they are working, must deal with paperwork. They must place orders, figure estimates, and maintain records of where to purchase hundreds of different types of furnishings.

Places of Employment

About 37,000 persons worked as interior designers in 1976, primarily in large cities.

Some experienced interior designers manage their own establishments, either alone or as partners with other designers. Most designers work for large design firms that employ designers to work independently with their clients or as assistants to senior designers.

Other interior designers work in large department or furniture stores, and a few have permanent jobs with hotel and restaurant chains. Some work for architects, furniture suppliers, antique dealers, furniture and textile manufacturers, or other manufacturers in the interior furnishing field. Interior designers also work for magazines that feature articles on home furnishings.

Training, Other Qualifications, and Advancement

Formal training in interior design is becoming increasingly important for entry into this field. Most architectural firms, well-established design firms, department and furniture stores, and other major employers will accept only trained people for beginning jobs. The types of training available include 3-year programs in a professional school of interior design, 4-year college or university programs that grant a bachelor's degree, or postgraduate programs leading to a master's degree or Ph. D. The curriculum usually includes principles of design, history of art, freehand and mechanical drawing, painting, study of the essentials of architecture as they relate to interiors, design of furniture and exhibitions, and study of various materials, such as wood, plastics, metals, and fabrics. A knowledge of furnishings, art pieces, and antiques is important. In addition, courses in sales and business subjects are valuable.

Membership in the American Society of Interior Design is a recognized mark of achievement in this profession. Membership usually requires the completion of 3 or 4 years of post-high school education in design, and several years of practical experience in the field, including supervisory work.

Persons starting in interior design usually serve a training period with a design firm, department store, or furniture store. They may act as receptionists, as shoppers with the task of matching materials or finding accessories, or as stockroom assistants, salespersons, assistant decorators, or junior designers. In most instances, from 1 to 5 years of on-the-job training are required before a trainee becomes eligible for advancement to designer. Beginners who do not get trainee jobs often sell fabric, lamps, or other interior furnishings in department or furniture stores to gain experience in dealing with customers and to become familiar with the merchandise. There is no guarantee, however, that this experience will result in a job in design, although it could lead to a career in merchandising.

After considerable experience, designers may advance to design department head or to other supervisory positions in department stores or in large design firms. If they have the necessary funds, they may open their own businesses.

A successful designer must be creative, have good color sense and good taste, and be able to work well with people. At times, designers' tastes may not match those of their clients, so designers must be willing to make changes in plans they consider attractive and functional.

Employment Outlook

Persons seeking beginning jobs in interior design are expected to face competition through the mid-1980's. Interior design is a competitive field that requires talent, training, and business ability, and many applicants vie for the better jobs. Talented college graduates who major in interior design and graduates of professional schools of interior design will find the best opportunities for employment. Those with less talent or without formal training will find it increasingly difficult to enter this field.

Employment of interior designers is expected to increase about as fast as the average for all occupations through the mid-1980's. Growth in population, personal incomes, expenditures for home and office furnishings, and the increasing use of design services in both homes and commercial establishments should contribute to a greater demand for these workers. In addition to new jobs, some openings will be created by the need to replace designers who die, retire, or leave the field.

Department and furniture stores are expected to employ an increasing number of designers as their share in the growing volume of design work for commercial establishments and public buildings increases. Interior design firms also are expected to continue to expand.

Employment of interior designers, however, is sensitive to changes in general economic conditions because people often forego design services when the economy slows down.

Earnings and Working Conditions

Beginners usually are paid a straight salary plus a small commission. Starting salaries can range from the minimum wage plus a small commission to a fixed salary of $140 a week or higher. Firms in large metropolitan areas usually pay the highest salaries.

Some experienced interior designers are paid straight salaries, some receive salaries plus commissions based on the value of their sales, while others work entirely on commissions.

Incomes of experienced designers vary greatly. Many persons earn from $6,000 to $12,000 a year, and highly successful designers can earn much more. A small number of nationally recognized professionals earn well over $50,000 annually.

The earnings of self-employed designers vary widely, depending on the volume of business, their professional reputation, the economic level of their clients, and their own business competence.

Designers' work hours are sometimes long and irregular. Designers usually adjust their workday to suit the needs of their clients, meeting with them during the evenings or on weekends when necessary.

Sources of Additional Information

For information about careers in interior design and a list of schools offering programs in this field, contact:

American Society of Interior Design, 730 Fifth Ave., New York, N.Y. 10019.

INTERPRETERS

(D.O.T. 137.268)

Nature of the Work

Interpreters help people of different nations and different cultures overcome language barriers by translating what has been said by one person into a language that can be understood by others.

There are two basic types of oral translation or interpretation: simultaneous and consecutive. In simultaneous interpretation, the interpreter translates what is being said in one language as the speaker continues to talk in another. This technique requires speed and fluency in the foreign language on the part of the interpreter and it is made possible by the use of electronic equipment, which allows for the transmission of the simultaneous speeches. Conference interpreters often work in a glass-enclosed booth from which they can see the speaker. While listening through earphones to what is being said, they simultaneously give the translation by speaking into a microphone. People attending the conference who do not understand the language being spoken may listen to an interpreter's rendition by simply pushing a button or turning a dial to get the translation in the language they know. Simultaneous interpretation generally is preferred for conferences, and the development of portable equipment has extended its use to other large-scale situations.

Consecutive interpretation also involves oral translation. However, the speaker and the interpreter take turns speaking. A consecutive interpreter must have a good memory and generally needs to take notes in order to give a complete and exact translation. The chief drawback of consecutive interpretation is that the process is time consuming, because the speaker must wait for the translation before proceeding.

Since interpreters are needed whenever people find language a barrier, the work involves a variety of topics and situations. Interpreters may be needed, for example, to explain various aspects of American life to a group of foreign visitors, or they may be required to interpret highly technical speeches and discussions for medical or scientific gatherings. They may work at the United Nations, or find themselves in a courtroom or escorting foreign leaders or business people visiting the United States.

Places of Employment

An estimated 175 persons worked full time as interpreters in the United States in 1976. The largest single concentration of interpreters was at the United Nations in New York where about 90 people held full-time posts. Various other international organizations, located primarily in Washington, D.C., also employed regular staff interpreters. Among these are the Organization of American States, the International Monetary Fund, the Pan American Health Organization, and the World Bank. Within the Federal Government, the Departments of State and Justice were the major employers of full-time interpreters.

An estimated 500 persons worked as freelance interpreters. Freelance interpreters may work for various employers under short-term contracts. About four-fifths were under contract on a temporary basis to the Department of State and the Agency for International Development to serve as escort interpreters for foreign visitors to the United States. Some of these interpreters worked a great portion of the year; others worked for only a few days. The remainder of the freelance interpreters worked in the freelance conference field. These interpreters provided for both the supplementary needs of the international and Federal agencies and for the periodic, short-term needs of various international conferences that are held in this country. The Organization of American States employs many people in this area. Besides persons who work strictly as interpreters, many others do some interpretation work in the course of their jobs.

Training, Other Qualifications, and Advancement

A complete command of two languages or more is the usual requirement for becoming an interpreter. Interpreters must instantaneously call to mind words or idioms corresponding to the foreign ones. An extensive working vocabulary and ease in making the transition from one language structure to another are necessary.

Students who want to become interpreters should become fluent in several languages. Interpreters who work at the United Nations, for example, must know at least three of the six official U.N. languages: Arabic, Chinese, English, French, Russian, and Spanish. Portuguese and, to

Interpreters must instantaneously call to mind words or idioms corresponding to foreign ones.

some extent, Japanese and German are also valuable to interpreters in the United States.

Two schools in the United States offer special programs for interpreter training. Both require foreign language proficiency upon entry. The Georgetown University School of Languages and Linguistics in Washington, D.C., has a 1- or 2-year course of study leading to a Certificate of Proficiency as a conference interpreter. The certificate is recognized by the International Association of Conference Interpreters. Applicants to Georgetown University must qualify on the basis of an entrance test and a minimum of previous studies at the university level; successful candidates usually hold a bachelor's degree, often a master's degree. The Monterey Institute of Foreign Studies in Monterey, Calif., through its Department of Translation and Interpretation, offers a 2-year graduate program leading to a master's degree in Intercultural Communication and a graduate certificate in either translation, translation/interpretation, or in conference interpretation. Applications to the Institute must have a bachelor's degree and pass an aptitude test. They must be fluent in English, plus one other language if studying translation, or in two other languages if wishing to enter the interpretation field. After taking the basic courses in translation and interpretation theory, students must pass a qualifying examination in order to enter the translation or interpretation program. This qualifying examination usually takes place after two semesters of work at the Institute.

Many individuals may qualify as interpreters on the basis of their foreign backgrounds for positions in which extensive experience and a broad education are not as crucial as for other types of interpretation. For example, consecutive interpreters employed by the Immigration and Naturalization Service of the U.S. Department of Justice serve primarily in interpreting legal proceedings, such as hearings for aliens.

Besides being proficient in languages, interpreters are expected to be generally well informed on a broad range of subjects, often including technical subjects such as medicine or scientific or industrial technology. Work as a translator may serve as a useful background in maintaining an up-to-date vocabulary in various specialized or technical areas. The experience of living abroad also is very important for an interpreter.

Although there is no standard requirement for entry into the profession, a university education usually is considered essential.

People interested in becoming interpreters should be articulate speakers and have good hearing. The exacting nature of this profession requires quickness, alertness, and a constant attention to accuracy. Working with all types of people requires good sense, tact, and the emotional stamina to deal with the tensions of the job. It is essential that interpreters maintain confidentiality in their work and that they give honest interpretations.

Advancement in the interpreting field generally is based on satisfactory service. There is some advancement from escort level interpreting to conference level work.

Employment Outlook

Interpreters traditionally face very stiff competition for the limited number of openings. Little change is expected in the number of full-time interpreters through the mid-1980's. Most opportunities, therefore, should result from the need to replace workers who die, retire, or leave their jobs for other reasons. Experience has shown that any slight or sporadic increase in the demand for interpreters can be met by the existing pool of freelance workers. Only highly qualified applicants will find jobs.

Qualified interpreters also may find work abroad. The demand for interpreters in Europe, where so many different languages are spoken, is far greater than in the United States.

People who have linguistic abilities also may find some employment opportunities as translators. In fact, many interpreters find the ability to do translation work, if not requisite, an occupational asset. Foreign language competence also is important for careers in the fields of foreign service, international business, and language education.

Earnings and Working Conditions

Salaries of interpreters depend upon the type of interpreting done as well as the ability and performance of the individual. The tax-free annual starting salary for conference interpreters at the United Nations was $14,300 in 1976. Outstanding U.N. interpreters could expect to earn almost $30,000.

Beginning salaries for interpreters in various other international organizations were over $15,000 a year, according to the limited information available. In addition, international organizations often paid supplementary living and family allowances.

Junior interpreters who worked for the U.S. Department of State received $17,056 a year in 1977. Starting salaries were somewhat lower for interpreters in other Federal agencies.

In the freelance field, interpreters are paid on a daily basis. Conference interpreter salaries ranged from about $125 to $160 a day in 1976. The U.S. Department of State paid a daily salary of $125.

Freelance escort interpreters received salaries ranging from about $40 to over $80 a day, based on the individual's skill and prior performance. Interpreters on assignment usually could expect to be paid for a 7-day week. Interpreters are paid transportation expenses by the employing agency and also receive an allowance to cover the cost of accommodations, meals, and other expenses incidental to their assignments.

The conditions under which interpreters work vary widely. In freelancing, there is little job security because of demand fluctuations, and the duration of various freelance assignments ranges from a few days for a typical conference to several weeks for some escort assignments. Although the hours interpreters work are not necessarily long, they are often irregular. In some instances, especially for escort freelance workers, a great deal of travel to a wide variety of locations is required.

Sources of Additional Information

Information on the interpreting profession is available from:

The American Association of Language Specialists, 1000 Connecticut Ave. NW., Suite 9, Washington, D.C. 20036.

For information on entry requirements and courses of study at the two schools offering specialized programs for interpreters, contact:

Division of Interpretation and Translation, School of Languages and Linguistics, Georgetown University, Washington, D.C. 20057.

Department of Translation and Interpretation, Monterey Institute of Foreign Studies, P.O. Box 1978, Monterey, Calif. 93940.

Information about employment opportunities is available from:

Language Services Division, U.S. Department of State, Washington, D.C. 20520.

Secretariat Recruitment Service, United Nations, New York, N.Y. 10017.

LANDSCAPE ARCHITECTS

(D.O.T. 019.081)

Nature of the Work

Everyone enjoys attractively designed residential areas, public parks, and commercial zones. Landscape architects design these areas to satisfy functional needs as well as people's aesthetic sense.

Landscape architects assist many types of organizations in planning and designing a project, from a real estate firm starting a new suburban development to a city constructing an airport or park. They may plan and arrange trees, shrubbery, walkways, open spaces, and other features as well as supervise the necessary grading, construction, and planting.

Landscape architects first consider the nature and purpose of the project, the funds available, and the proposed buildings in planning a site. Next, they study the site and map features such as the slope of the land and the position of existing buildings, roads, walkways, and trees. They also observe the sunny parts of the site at different times of the day, soil texture, existing utilities, and many oth-

Persons planning careers in landscape architecture should be interested in art and nature.

er landscape features. Then, after consulting with the project architect or engineer, they draw up plans to develop the site. If the plans are approved, landscape architects prepare working drawings showing all existing and proposed features. Landscape architects outline in detail the methods of constructing features and draw up lists of building materials. They then may invite landscape contractors to bid for the work.

Although landscape architects help design and supervise a wide variety of projects, some specialize in certain types of projects such as parks and playgrounds, hotels and resorts, shopping centers, or public housing. Still others specialize in services such as regional planning and resource management, feasibility and cost studies, or site construction.

Places of Employment

About 13,000 persons worked as landscape architects in 1976. Most were self-employed or worked for architectural, landscape architectural, or engineering firms. Government agencies concerned with forest management, water storage, public housing, city planning, urban renewal, highways, parks, and recreation also employed many landscape architects. The Federal Government employed over 550 landscape architects, mainly in the Departments of Agriculture, Defense, and Interior. Some landscape architects were employed by landscape contractors, and a few taught in colleges and universities.

Employment of landscape architects is concentrated around large metropolitan areas, primarily on the East and West Coasts. However, employment opportunities have recently been growing in the Southwest.

Training, Other Qualifications, and Advancement

A bachelor's degree in landscape architecture which takes 4 or 5 years is usually the minimum educational requirement for entering the profession. The American Society of Landscape Architects accredits about 40 colleges and universities that offer such programs. About 60 other schools also offer programs or courses in landscape architecture.

A person interested in landscape architecture should take high school courses in mechanical or geometrical drawing, art, botany, and more mathematics than the minimum required for college entrance. A good background in English grammar also is important, since landscape architects must be able to express their ideas verbally as well as graphically.

College courses include technical subjects such as surveying, landscape construction, sketching, design communications, and city planning. Other courses include horticulture and botany as well as English, science, and mathematics. Most college programs also include field trips to view and study examples of landscape architecture.

Thirty-eight States require a license, based on the results of a uniform national licensing examination, for independent practice of landscape architecture. Admission to the licensing examination usually requires a degree from an accredited school of landscape architecture plus 2 to 4 years of experience. Lengthy apprenticeship training (6-8 years) under an experienced landscape architect sometimes may be substituted for college training.

Persons planning careers in landscape architecture should have creative imagination, drawing talent, and an appreciation for nature. Self-employed landscape architects also must understand business practices. Working for landscape architects or landscape contractors during summer vacations helps a person understand the practical problems of the profession, and may be helpful in obtaining employment after graduation.

New graduates usually begin as junior drafters, tracing drawings and doing other simple drafting work. After gaining experience, they help prepare specifications and construction details and handle other aspects of project design. After 2 or 3 years they can usually carry a design through all stages of development. Highly qualified landscape architects may become associates in private firms; landscape architects who progress this far, however, often open their own office.

Employment Outlook

Employment of landscape architects is expected to grow faster than the average for all occupations through the mid-1980's. Additionally, new entrants will be needed as replacements for landscape architects who retire or die.

Anticipated rapid growth in new construction is expected to play a major role in increasing demand for landscape architects. However, during slow periods the demand could be limited.

Another factor underlying the increased demand for landscape architects is the growing interest in city and regional environmental planning. Metropolitan areas will require landscape architects to plan efficient and safe land use for growing populations. Legislation to promote environmental protection could also spur demand for landscape architects to participate in planning and designing transportation systems, outdoor recreation areas, and land reclamation projects, as well as to ensure safe industrial growth.

Earnings and Working Conditions

Newly graduated landscape architects generally earned from $10,500 to $12,500 a year in 1976. Most experienced landscape architects earned between $15,000 and $20,000 a year, although some highly skilled persons earned salaries of over $30,000 a year. Salaries of self-employed landscape architects ranged from $10,000 a year to well over $25,000 a year, depending on the individual's educational background, experience, and geographic location.

The Federal Government, in 1977, paid new graduates with a bachelor's degree annual salaries of $9,300 or $11,500 depending on their qualifications. Those with an advanced degree had a starting salary of $14,100 a year. Landscape architects in the Federal Government averaged $22,500 a year.

Salaried employees both in government and in landscape architectural firms usually work regular hours, although employees in private firms may also work overtime during seasonal rush periods or to meet a deadline. Self-employed persons often work long hours.

Sources of Additional Information

Additional information, including a list of colleges and universities offering accredited courses of study in landscape architecture, is available from:

American Society of Landscape Architecture, Inc., 1750 Old Meadow Rd., McLean, Va. 22101.

For information on a career as a landscape architect in the Forest Service, write to:

U.S. Department of Agriculture, Forest Service, Washington, D.C. 20250.

LAWYERS

(D.O.T. 110.108, .118, and 119.168)

Laws permeate every aspect of our society. They regulate the entire spectrum of relationships among individuals, groups, businesses, and governments. They define rights as well as restrictions, covering such diverse human activities as judging and punishing criminals, granting patents, drawing up business contracts, paying taxes, settling labor disputes, constructing buildings, and administering wills.

Because social needs and attitudes are continually changing, the legal system that regulates our social, political, and economic relationships also is subject to change. The task of keeping the law responsive to human needs is the work of lawyers. Also called attorneys, lawyers are the link between the legal system and society. To perform this role, they must understand the world around them and be sensitive to the numerous aspects of society that are touched by the law. They must comprehend not only the words of a particular statute, but the human circumstances it addresses as well.

As our body of laws grows more voluminous and complex, as the legal system takes on new regulatory tasks in social welfare, racial integration, energy conservation, and other areas, the work of lawyers takes on wider significance.

Nature of the Work

Lawyers perform a wide variety of tasks, but certain basic activities are common to nearly every attorney's work. Probably the most fundamental of all is interpretation of the law. Every attorney, whether representing the defendant in a murder trial or the plaintiff (suing party) in a lawsuit, combines an understanding of the relevant laws with knowledge of the facts in the particular case in order to determine how the first affects the second. Based on this determination, the attorney decides what courses of action would best serve the interests of the party he or she represents.

In order to interpret the law knowledgeably, lawyers do research. They must stay abreast of their field, in both legal and nonlegal matters. An attorney representing electronics manufacturers, for example, must follow trade journals as well as the latest Federal regulations affecting his or her clients. Attorneys in the State Department must remain well-versed in current events and international law, while divorce lawyers spend a certain portion of their time reading about the changing role of the family in modern society. Research also includes specific, in-depth reading on the legal questions or substantive matters of an individual case. In any event, the overwhelming volume of literature to be digested requires a lawyer to conduct research efficiently, quickly picking out and evaluating the substance of a particular article or court case.

Usually a lawyer's work also involves contact with people. Attorneys consult with their clients to determine the details of their specific problems, advise them of the law, and suggest actions that might or must be taken. To be effective, a lawyer learns to deal with people in a courteous, efficient fashion.

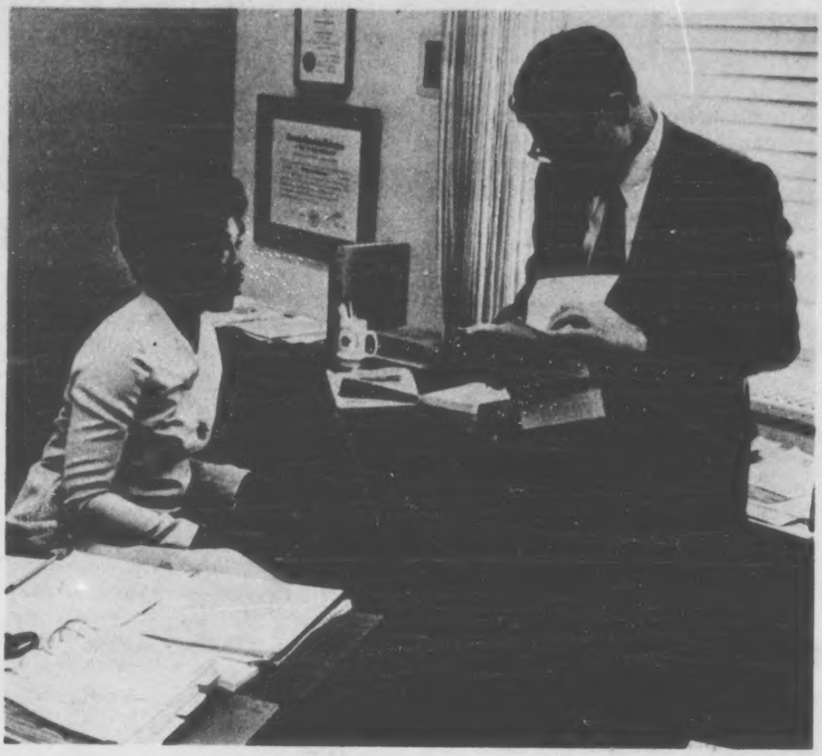
Finally, most lawyers must do some writing in the course of their work. This may take the form of reports, legal briefs, or administrative paperwork. In all cases, the attorney calls upon his or her ability to communicate clearly and precisely.

The more detailed aspects of the legal profession depend upon the lawyer's individual field and position. Most lawyers are engaged in general practice and handle all kinds of legal work for clients. They counsel the individual who wants to buy property, make a will, sign a contract, or settle an estate. These lawyers perform whatever tasks are necessary to help their client comply with the law.

A significant number specialize in one branch of law, such as corporate, criminal, labor, patent, real estate, tax, or international law. Communications lawyers, for example, may represent radio and television stations in their dealings with the Federal Communications Commission (FCC). They help established stations prepare and file license renewal applications, employment reports, and other documents required by the FCC on a regular basis. They also keep their clients informed of changes in FCC regulations. Communications lawyers give similar assistance to individuals or corporations wishing to buy or sell a station or establish a new one.

Other lawyers specialize in representing public utilities before the Federal Power Commission (FPC) and other regulatory agencies. For example, they handle matters involving the reasonableness of utility rates. They help a firm develop its case, assist in preparing strategy, arguments, and testimony, prepare the case for presentation at a trial or administrative hearing, and argue the case. These lawyers also keep clients informed about changes in regulations and advise them as to the legality of their actions.

Private practitioners specialize in other areas, too. Some draw up wills, trusts, contracts, mortgages, and other legal documents; conduct out-of-court negotiations; and do investigative and other legal work to prepare for trials. Some may act as trustees by managing a person's property and



Corporate lawyers reviewing legal matters pertaining to the company.

funds, or as executors by seeing that the provisions of their client's will are carried out. A small number of lawyers devote themselves entirely to courtroom work. An increasing number handle only so-called public interest cases. These cases, either civil or criminal, have a potential impact extending well beyond the individual client. Attorneys who take these cases hope to use them as a vehicle for legal and social reform.

Some lawyers are employed full time by a single client. Known as house counsel, these lawyers usually work for a corporate firm, advising and acting on legal questions that arise from the company's business activities. These questions may involve patents for new productions, FTC regulations, a business contract with another company, or a collective bargaining agreement with a union.

Attorneys employed at the various levels of government constitute still another category. Criminal lawyers may work in the office of a State attorney general; they also may be employed by a prosecutor's or public defender's office, or by the court itself. At the Federal level, attorneys perform investigations for the Justice Department and regulatory agencies. Lawyers at every level of government also help develop laws and programs; they prepare drafts of proposed legislation, establish law enforcement procedures, and argue cases.

Many people who have legal training do not work as lawyers but use their knowledge of law in other occupations. They may, for example, be journalists, management consultants, financial analysts, insurance claim adjusters, tax collectors, probation officers, and credit investigators. A legal background also is an asset to those seeking or holding public office.

Places of Employment

About 396,000 persons worked as lawyers in 1976. Almost three-fourths of them, 280,000, practiced privately, with about 40 percent in solo practice and the other 60 percent working in law firms. Of the remaining 116,000, about one-third were employed as house counsel by various business firms; one-fourth worked in the Federal Government; the remainder held positions in State and local government. In addition, about 8,000 lawyers taught full or part time in law schools. Some salaried lawyers also have independent practices; others do legal work part time while in another occupation.

Training, Other Qualifications, and Advancement

In order to practice law in the courts of any State, a person must be admitted to its bar. Applicants for admission to the bar must pass a written examination; however, a few States drop this requirement for graduates of their own law schools. Lawyers who have been admitted to the bar in one State occasionally may be admitted in another without taking an examination provided they meet that State's standards of good moral character and have a specified period of legal experience. Each Federal court or agency sets its own qualifications for those practicing before it.

To qualify for the bar examination in most States, an applicant must have completed 3 years of college and have graduated from a law school approved by the American Bar Association (ABA) or the proper State authorities. (ABA approval signifies that the law school meets the minimum standards necessary to allow its graduates to take the bar exam and practice law in any State. Graduates of nonapproved schools are restricted to the State in which the school is located.) A few States accept the study of law wholly in a law office or in combination with study in a law school; only California accepts the study of law by correspondence as qualification for taking the bar exam. Several States require registration and approval of students by the State Board of Examiners, either before they enter law school or during the early years of legal study. In a few States, candidates must complete clerkships before they are admitted to the bar.

Although there is no nationwide bar exam, most States and the District of Columbia participate in the Multistate Bar Examination (MBE). The MBE, covering issues of broad interest, is given in addition to the State bar exam; how the MBE score is treated varies from State to State.

The required college and law school education usually takes 7 years of full-time study after high school—4 years of undergraduate study followed by 3 years in law school. Although a number of law schools accept students after 3 years of college, an increasing number require applicants to have a bachelor's degree. To meet the needs of students who can attend only part time, a number of law schools have night or part-time divisions which usually require 4 years of study. In 1976, about one-fifth of all graduates of ABA-approved schools were part-time students.

Competition for admission to law school has become intense in the last few years. Enrollments rose very rapidly between 1969 and 1972, and, according to one estimate, applications outnumbered available openings by almost 10 to 1 in the mid-1970's. Although the increase in enrollments is expected to slow by the 1980's, law school admission will remain the first of several hurdles for prospective lawyers.

Preparation for a career as a lawyer really begins in college. Although there is no such thing as a "prelaw major," the undergraduate program almost always makes a difference. Certain courses and activities are desirable because they give the student the skills needed to succeed both in law school and in the profession. Essential skills—the ability to write, to read and analyse, to think conceptually and logically, and to communicate verbally—are learned during high school and college. The best undergraduate program is one that cultivates these skills while at the same time broadening the student's view of the world. Majors in the social sciences, natural sciences, and humanities all fill the bill, as long as the student does not specialize too narrowly.

Students interested in a particular aspect of the law may find it helpful to take related courses; for example, engineering and science courses for the prospective patent attorney, and accounting for the future tax lawyer. In addition, typing is advisable simply for convenience in law school.

Acceptance by most law schools depends on the applicant's ability to demonstrate an aptitude for the study of law, usually through good grades and the Law School Admission Test (LSAT), administered by the Educational Testing Service. In 1976, 163 law schools had American Bar Association approval. Others—chiefly night schools—were approved by State authorities only.

The first year or year and a half of law school generally is devoted to fundamental courses such as constitutional law, contracts, property law, and judicial procedure. In the remaining time, students may elect specialized courses in fields such as tax, labor, or corporation law. Practical experience often is acquired by participation in school-sponsored legal aid activities, in the school's practice court where students conduct trials under the supervision of experienced lawyers, and through writing on legal issues for the school's law journal. Graduates receive the degree of *juris doctor* (J.D.) from most schools as the first professional degree. Advanced study often is desirable for those planning to specialize, do research, or teach in law schools.

The practice of law involves a great deal of responsibility. Persons planning careers in law should like to work with people and ideas, and be able to win the confidence of their clients.

Most beginning lawyers start in salaried positions, although some go into independent practice immediately after passing the bar examination. Newly hired salaried attorneys usually act as research assistants (law clerks) to experienced lawyers or judges. After several years of progressively responsible salaried employment, many lawyers go into practice for themselves. Some lawyers, after years of practice, become judges.

Employment Outlook

A rapid increase in the number of law school graduates has created keen competition for the available jobs. In the years ahead, the number of graduates is expected to increase further and intensify this competition.

Employers will be selective in hiring new lawyers. Graduates of well-known law schools and those who rank high in their classes should find salaried positions with law firms, on the legal staffs of corporations and government agencies, and as law clerks for judges. Graduates of less prominent schools and those with lower scholastic ratings will experience some difficulty in finding salaried jobs. However, many will find opportunities in fields where legal training is an asset but not normally a requirement.

The employment of lawyers is expected to grow faster than the average for other occupations through the mid-1980's as increased business activity and population create a demand for attorneys to deal with a growing number of legal questions. Supreme Court decisions extending the right to counsel for persons accused of lesser crimes, the growth of legal action in the areas of consumer protection, the environment, and safety, and an expected increase in the use of legal services by middle-income groups through prepaid legal service programs also should provide employment opportunities. Other jobs will be created by the need to replace lawyers who die, retire, or leave the occupation for other reasons.

Prospects for establishing a new practice probably will continue to be best in small towns and expanding suburban areas, as long as there already exists an active market for legal services in which the new lawyer can find clients. In such communities competition is likely to be less than in big cities and new lawyers may find it easier to become known to potential clients; also, rent and other business costs are somewhat lower. Nevertheless, starting a new practice will remain an expensive and risky proposition that should be weighed carefully. Salaried positions will be limited largely to urban areas where the chief employers of legal talent—government agencies, law firms, and big corporations—are concentrated.

Earnings and Working Conditions

Lawyers entering practice in 1976 earned a wide range of starting salaries—from about $10,000 to $23,000 a year. Most fell in the $15,000 to $18,000 range. Factors affecting the salaries offered to new graduates include: their academic records; type, size, and location of their employers; and whether the new lawyer has any specialized educational background that the employer requires. The field of law makes a difference, too. Patent lawyers, for example, tend to earn more than general corporate attorneys. Lawyers with at least a year's experience working in manufacturing and business firms earned about $18,000 a year; those with a few years of experience earned $30,000 or more annually. In the Federal Government, annual starting salaries for attorneys in 1977 were $14,097 or $17,056, depending upon academic and personal qualifications. Federal attorneys with some experience earned $24,308 or more a year.

Beginning lawyers engaged in legal-aid work usually receive the lowest starting salaries. New lawyers starting their own practices may earn little more than expenses during the first few years and may need to work part time in other occupations.

Lawyers on salary receive increases as they assume greater responsibility. Incomes of lawyers in private practice usually grow as their practices develop. Private practitioners who are partners in law firms generally earn more than those who practice alone.

Lawyers often work long hours and are under considerable pressure when a case is being tried. In addition, they must keep abreast of the latest laws and court decisions. However, since lawyers in private practice can determine their own hours and workload, many stay in practice well past the usual retirement age.

Sources of Additional Information

Persons considering law as a career will find information on law schools and prelaw study in the *Prelaw Handbook*, published annually (Princeton, N.J.: Educational Testing Service). Copies may be available in public or school libraries. In addition, many colleges and universities have a prelaw advisor who counsels undergraduates about their undergraduate course work, the LSAT, law school applications, and other matters.

Information on law schools and law as a career is available from:

Information Services, The American Bar Association, 1155 East 60th St., Chicago, Ill. 60637. (There may be a slight charge for publications.)

Information on law school accreditation is available from:

Association of American Law Schools, Suite 370, 1 Dupont Circle NW., Washington, D.C. 20036.

For advice on financial aid, contact a law school financial aid officer.

The specific requirements for admission to the bar in a particular State may be obtained at the State capital from the clerk of the Supreme Court or the secretary of the Board of Bar Examiners.

LIBRARIANS

(D.O.T. 100.118 through .388)

Nature of the Work

Librarians make information available to people. They serve as a link between the public and the millions of sources of information by selecting and organizing materials, making them accessible, and assisting in their use.

Library work is divided into two areas: user services and technical services. Librarians in user services—for example, reference and children's librarians—work directly with the public helping them find the information they need. Librarians in technical services—such as acquisition librarians—are primarily concerned with preparing materials for use and do not frequently deal with the public. They order, classify, and catalog all types of materials.

The size of the library usually determines the scope of a librarian's job. In small libraries, the job may include both user and technical services. The librarian may select and organize materials, publicize services, do research, and give reference help to groups and individuals. In large libraries, librarians usually specialize in either user or technical services and specialize further in certain subject areas, such as science, business, the arts, or medicine. A librarian in technical services who specializes in engineering, for example, may review books or write summaries of articles on new engineering developments.

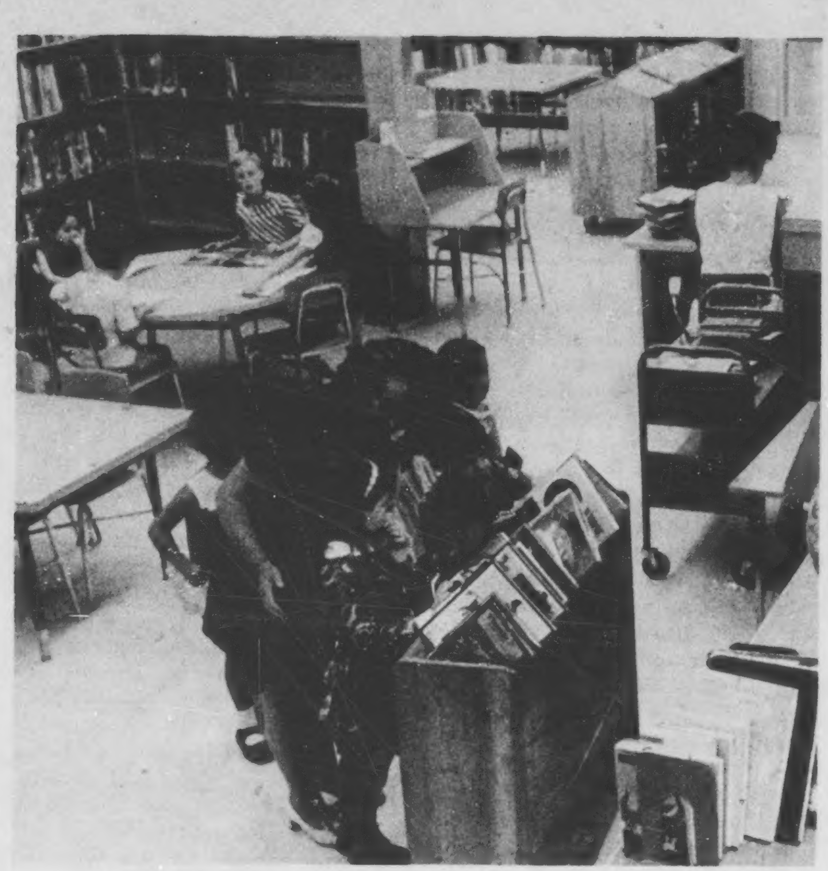
Regardless of the nature of their work, librarians generally are classified according to the type of library in which they work: public libraries, school media centers, college and university libraries, and special libraries.

Public librarians serve all kinds of people—children, students, research workers, teachers, and others. Increasingly, public librarians provide special materials and services to culturally and educationally deprived persons, and to persons who, because of physical handicaps, cannot use conventional print.

The professional staff of a large public library system may include the chief librarian, an assistant chief, and several division heads who plan and coordinate the work of the entire library system. The system also may include librarians who supervise branch libraries and specialists in certain areas of library work. The duties of some of these specialists are described briefly in the following paragraphs.

Acquisition librarians purchase books and other materials to maintain a well-balanced library that meets the needs and interests of the public. *Catalogers* classify these materials by subject and otherwise describe them to help users find what they are looking for. *Reference librarians* answer specific questions and suggest sources of information.

Some librarians work with specific groups of readers. *Children's librarians* serve the special needs of young people by finding books they will enjoy and showing them how to use the library. They may plan and conduct



School librarian showing students how to use the library.

special programs such as story hours or film programs. Their work in serving children often includes working with school and community organizations. *Adult services librarians* suggest materials suited to the needs and interests of adults. They may cooperate in planning and conducting education programs, such as community development, public affairs, creative arts, problems of the aging, and home and family. *Young adult services librarians* help junior and senior high school students select and use books and other materials. They may organize programs of interest to young adults, such as book or film discussions or concerts of recorded music. They also may coordinate the library's work with school programs. *Extension or outreach librarians working in bookmobiles* offer library services to people not adequately served by a public library such as those in inner city neighborhoods, migrant camps, rural communities, and institutions, including hospitals and homes for the aged.

School librarians instruct students in the use of the school library and help them choose from the media center's collection of print and nonprint materials items that are related to their interests and to classroom subjects. Working with teachers and supervisors, school librarians familiarize students with the library's resources. They prepare lists of materials on certain subjects and help select materials for school programs. They also select, order, and organize the library's materials. Increasingly, the school library is viewed as part of the entire instructional system rather than a resource that students use 1 or 2 hours a week. As a result, the scope of the duties of many school librarians' has widened. In some schools, librarians work with teachers to develop units of study or independent study programs, and also may participate in team teaching.

Very large high schools may employ several school librarians, each responsible for a particular function of the library program or for a special subject area. *Media specialists*, for example, develop audio-visual programs to be included in or to supplement the curriculum. They also may develop materials and work with teachers on curriculum.

College and university librarians serve students, faculty members, and research workers in institutions of higher education. They may provide general reference service or may work in a particular subject field, such as law, medicine, economics, or music. Those working on university research projects operate documentation centers that use computers to record, store, and retrieve specialized information. College and university librarians may teach classes in the use of the library.

Special librarians work in libraries maintained by government agencies and by commercial and industrial firms, such as pharmaceutical companies, banks, advertising agencies, and research laboratories. They provide materials and services covering subjects of special interest to the organization. They build and arrange the organization's information resources to suit the needs of the library users. Special librarians assist users and may conduct literature searches, compile bibliographies, and in other ways provide information on a particular subject.

Others called *information science specialists*, like special librarians, work in technical libraries or information centers of commercial and industrial firms, government agencies, and research centers. Although they perform many duties of special librarians, they must possess a more extensive technical and scientific background and a knowledge of new techniques for handling information. Information science specialists abstract complicated information into condensed, readable form, and interpret and analyze data for a highly specialized clientele. Among other duties, they develop classification systems, prepare coding and programming techniques for computerized information storage and retrieval systems, design information networks, and develop microfilm technology.

Information on library technicians and assistants is found in a separate statement in the *Handbook*.

Places of Employment

An estimated 128,000 professional librarians were employed in 1976. School librarians accounted for more than two-fifths of the total, and public libraries and colleges and universities each employed about one-fifth. The remainder worked in special libraries, including those in government agencies, or in institutions such as correctional facilities and hospitals. A small number served as consultants, as State and Federal Government administrators, and as faculty in schools of library science. In late 1975, the Federal Government employed about 3,300 professional librarians.

Most librarians work in cities and towns. Those attached to bookmobile units serve widely scattered population groups.

Training, Other Qualifications, and Advancement

A professional librarian ordinarily must complete a 1-year master's degree program in library science. A Ph. D. degree is an advantage to those who plan a teaching career in library schools or who aspire to a top administrative post, particularly in a college or university library or in a large library system. For those who are interested in the special libraries field, a master's degree or doctorate in the subject of the library's specialization is highly desirable.

In 1976, 58 library schools in the United States were accredited by the American Library Association and offered a master's degree in library science (M.L.S.). In addition, many other colleges offer graduate programs or courses within 4-year undergraduate programs.

Most graduate schools of library science require graduation from an accredited 4-year college or university, a good undergraduate record, and a reading knowledge of at least one foreign language. Some schools also require introductory undergraduate courses in library science. Most prefer a liberal arts background with a major in an area such as the social sciences, the arts, or literature. Some schools require entrance examinations.

Library science students usually specialize in the area in which they plan to work. An aspiring information science specialist, for example, takes courses on data processing fundamentals and computer languages in addition to the required library science courses. A student wishing to become a media specialist concentrates on courses in the use and development of audio-visual materials. Special librarians and information science specialists must have extensive knowledge of their subject matter as well as training in library science. They usually earn a bachelor's or higher degree in chemistry, for example, plus a master's or Ph. D. in library or information science.

Most States require that public school librarians be certified and trained both as teachers and librarians. They also may require that media specialists, for example, have specialized in media within the M.L.S. program. Some States require certification of public librarians employed in areas such as municipal, county, or regional library systems. The specific education and experience necessary for certification vary according to State and the school district. The local superintendent of schools and the State department of education can provide information about specific requirements in an area.

In the Federal Government, beginning positions require completion of a 4-year college course and a master's degree in library science, or demonstration of the equivalent in experience and education by a passing grade on an examination.

Many students attend library schools under cooperative work-study programs that combine the academic program with practical work experience in a library. Scholarships for training in library science are available under certain State and Federal programs and from library schools, as well as from a number of the large libraries and library associations. Loans, assistantships, and financial aid also are available.

Experienced librarians may advance to administrative positions or to specialized work. Promotion to these positions, however, is limited primarily to those who have completed graduate training in a library school, or to those who have specialized training.

Employment Outlook

The employment outlook for librarians is expected to be somewhat competitive through the mid-1980's. Although employment in the field is expected to grow over the period, the supply of persons qualified for librarianship is likely to expand as an increasing number of new graduates and labor force reentrants seek jobs as librarians.

Employment prospects are expected to be best in public libraries. The growth of a better educated population coupled with greater emphasis on adult and community education programs will require additional librarians. The educationally disadvantaged, the handicapped, and various minority groups also will need qualified librarians to provide special services. Also, the expanding use of computers to store and retrieve information will contribute to the increased demand for information specialists and library automation specialists in all types of libraries.

The demand for school librarians on the other hand, will not increase significantly. Enrollments in higher education, however, are expected to rise until the mid-1980's, resulting in a greater number of librarians in post-high school institutions.

In addition to openings from growth, replacements will be needed each year for librarians who retire, die, transfer to other types of work, or leave the labor force.

Employment opportunities will vary not only by type of library but also by the librarian's educational qualifications and area of specialization. Although the overall employment outlook is competitive, persons who are willing to work in libraries located away from the large East or West Coast cities will have better opportunities. New graduates having more recent training may have an employment advantage over reentrants, delayed entrants, or those who transfer into the profession. This is especially true for those wanting positions as information specialists where knowledge of the latest computer technologies is important. New graduates usually command lower beginning salaries, compared to more experienced workers, and this also may be an employment advantage.

Earnings and Working Conditions

Salaries of librarians vary by type of library, the individual's qualifications, and the size and geographical location of the library.

Starting salaries of graduates of library school master's degree programs accredited by the American Library Association average $10,594 a year in 1975, ranging from $9,692 in public libraries to $10,900 in school libraries. Average salaries for librarians in college and university libraries ranged from $11,400 a year for those with less than 5 years of experience to over $20,000 for directors of libraries. In general, librarians earned about 1 1/2 times as much as the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, the entrance salary for librarians with a master's degree in library science was $14,097 a year in 1977. The average salary for all librarians in the Federal Government was about $20,000.

The typical workweek for librarians is 5 days, ranging from 35 to 40 hours. The work schedule of public and college librarians may include some weekend and evening work. School librarians generally have the same workday schedule as classroom teachers. A 40-hour week during normal business hours is common for government and other special librarians.

The usual paid vacation after a year's service is 3 to 4 weeks. Vacations may be longer in school libraries, and somewhat shorter in those operated by business and industry. Many librarians are covered by sick leave; life, health, and accident insurance; and pension plans.

Sources of Additional Information

Additional information, particularly on accredited programs and scholarships or loans, may be obtained from:

American Library Association, 50 East Huron St., Chicago, Ill. 60611.

For information on requirements for special librarians, write to:

Special Libraries Association, 235 Park Ave., South, New York, N.Y. 10003.

Information on Federal assistance for graduate school library training under the Higher Education Act of 1965 is available from:

Office of Libraries and Learning Resources, Office of Education, U.S. Department of Health, Education, and Welfare, Washington, D.C. 20202.

Those interested in a career in Federal libraries should write to:

Secretariat, Federal Library Committee, Room 310, Library of Congress, Washington, D.C. 20540.

Material on information science specialists may be obtained from:

American Society for Information Science, 1140 Connecticut Ave. NW., Washington, D.C. 20036.

Individual State library agencies can furnish information on scholarships available through their offices, on requirements for certification, and general information about career prospects in their regions. State boards of education can furnish information on certification requirements and job opportunities for school librarians.

LIFE SCIENTISTS

(D.O.T. 040.081, 041.081, 041.168, 041.181, 041.281)

Nature of the Work

Life scientists, who study all aspects of living organisms, emphasize the relationship of animals and plants to their environment.

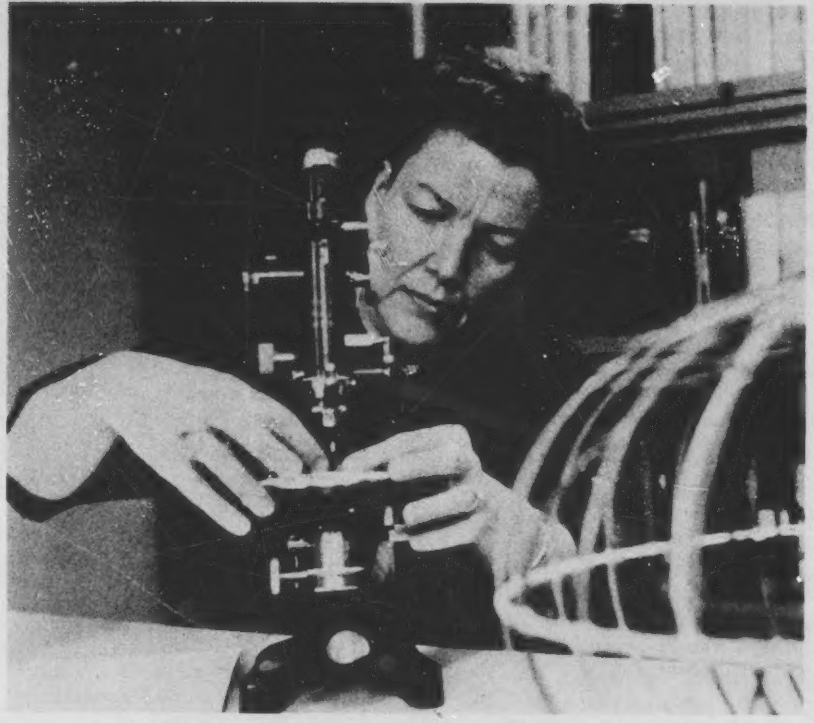
About one-third of all life scientists are primarily involved in research and development. Many conduct basic research to increase our knowledge of living organisms which can be applied in medicine, in increasing crop yields, and in improving the natural environment. When working in laboratories, life scientists must be familiar with research techniques and complex laboratory equipment such as electron microscopes. Knowledge of computers also is useful in conducting experiments. Not all research, however, is performed in laboratories. For example, a botanist who explores the volcanic Alaskan valleys to see what plants grow there also is doing research.

About one-third of all life scientists teach in colleges or universities; many also do independent research. Almost one-fifth work in management or administration ranging from planning and administering programs for testing foods and drugs to directing activities at zoos or botanical gardens. Some life scientists work as consultants to business firms or to government in their areas of specialization. Others write for technical publications or test and inspect foods, drugs, and other products. Some work in technical sales and services jobs for industrial companies where, for example, they demonstrate the proper use of new chemicals or technical products.

Scientists in many life science areas often call themselves *biologists*. However, the majority are classified by the type of organism they study or by the specific activity they perform.

Botanists deal primarily with plants and their environment. Some study all aspects of plant life, while others work in specific areas such as identifying and classifying plants or studying the structure of plants and plant cells. Other botanists concentrate on causes and cures of plant diseases.

Agronomists, who are concerned with the mass development of plants, improve the quality and yield of crops, such as corn, wheat, and cotton, by developing new growth methods or by controlling diseases, pests, and weeds. They also analyze soils to determine ways of increasing acreage yields and decreasing soil erosion.



Life scientists study living organisms and their life processes.

Horticulturists **work with orchard and garden plants such as fruit and nut trees, vegetables, and flowers. They seek to improve plant culture methods for the beautification of communities, homes, parks, and other areas as well as for increasing crop quality and yields.**

Zoologists **study various aspects of animal life—its origin, behavior, and life processes. Some conduct experimental studies with live animals in controlled or natural surroundings while others dissect animals to study the structure of their parts. Zoologists are usually identified by the animal group studied—ornithologists (birds), entomologists (insects), and mammalogists (mammals).**

Animal husbandry specialists **do research on the breeding, feeding, and diseases of domestic farm animals.** ***Veterinarians*** **study diseases and abnormal functioning in animals. (See statement on veterinarians elsewhere in the** ***Handbook.*****)**

Anatomists study the structure of organisms, from cell structure to the formation of tissues and organs. Many specialize in human anatomy. Research methods may entail dissections or the use of electron microscopes.

Some life scientists apply their specialized knowledge across a number of areas, and may be classified by the functions performed. *Ecologists*, for example, study the relationship between organisms and their environments, particularly the effects of environmental influences such as rainfall, temperature, and altitude on organisms. For example, ecologists extract samples of plankton (microscopic plants and animals) from bodies of water to determine the effects of pollution, and measure the radioactive content of fish.

Embryologists study the development of an animal from a fertilized egg through the hatching process or gestation period. They investigate the causes of healthy and abnormal development in animals.

Microbiologists are life scientists who investigate the growth and characteristics of microscopic organisms such as bacteria, viruses, and molds. They isolate and grow organisms for close examination under a microscope. *Medical microbiologists* are concerned with the relationship between bacteria and disease or the effect of antibiotics on bacteria. Other microbiologists may specialize in soil bacteriology (effect of microorganisms on soil fertility), virology (viruses), or immunology (mechanisms that fight infections).

Nutritionists examine the bodily processes through which food is utilized and transformed into energy. They learn how vitamins, minerals, proteins, and other nutrients build and repair tissues.

Pharmacologists conduct tests on animals such as rats, guinea pigs, and monkeys to determine the effects of drugs, gases, poisons, dusts, and other substances on the functioning of tissues and organs. They may develop new or improved drugs and medicines.

Pathologists specialize in the effects of diseases, parasites, and insects on human cells, tissues, and organs. Others may investigate genetic variations caused by drugs.

Biochemists and biological oceanographers, who are also life scientists, are included in separate statements elsewhere in the *Handbook*.

Places of Employment

An estimated 205,000 persons worked as life scientists in 1976. Almost 40,000 were agricultural scientists, about 100,000 were biological scientists, and about 65,000 were medical scientists.

Colleges and universities employ nearly three-fifths of all life scientists, in both teaching and research jobs. Medical schools and hospitals also employ large numbers of medical investigators. Sizable numbers of specialists in agronomy, horticulture, animal husbandry, entomology, and related areas work for State agricultural colleges and agricultural experiment stations.

About 18,000 life scientists worked for the Federal Government in 1976. Of these, over half worked for the Department of Agriculture, with large numbers also in the Department of the Interior, and in the National Institutes of Health. State and local governments combined employed about 22,000 life scientists.

Approximately 40,000 life scientists worked in private industry, mostly in the pharmaceutical, industrial chemical, and food processing industries in 1976. About 6,000 worked for nonprofit research organizations and foundations; a few were self-employed.

Life scientists are distributed fairly evenly throughout the United States, but employment is cencentrated in some metropolitan areas—for example, nearly 6 percent of all agricultural and biological scientists work in the Washington, D.C., metropolitan area. Life science teachers are concentrated in communities with large universities.

Training, Other Qualifications, and Advancement

Persons seeking a career in the life sciences should plan to obtain an advanced degree. The Ph. D. degree generally is required for college teaching, for independent research, and for many administrative jobs. A master's degree is sufficient for some jobs in applied research and college teaching. A health science degree is necessary for some jobs in medical research (See section on health occupations elsewhere in the *Handbook*.)

The bachelor's degree is adequate preparation for some beginning jobs, but promotions often are limited for those who hold no higher degree. New graduates with a bachelor's degree can start their careers in testing and inspecting jobs, or become technical sales and service representatives. They also may become advanced technicians, particularly in medical research or, with courses in education, a high school biology teacher. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Most colleges and universities offer life science curriculums. However, different schools may emphasize only certain areas of life science. For example, liberal arts colleges may emphasize the biological sciences, while many State universities and land-grant colleges offer programs in agricultural science.

Students seeking careers in the life sciences should obtain the broadest possible undergraduate background in biology and other sciences. Courses taken should include biology, chemistry, physics, and mathematics.

Many colleges and universities confer advanced degrees in the life sciences. Requirements for advanced degrees usually include field work and laboratory research as well as classroom studies and preparation of a thesis.

Prospective life scientists should be able to work independently or as part of a team and must be able to communicate their findings in clear and concise language, both orally and in writing. Some life scientists, such as those conducting field research in remote areas, must have good physical stamina.

Life scientists who have advanced degrees usually begin in research or teaching jobs. With experience, they may advance to jobs such as supervisors of research programs.

Employment Outlook

Employment opportunities for life scientists are expected to be good for those with advanced degrees through the mid-1980's, but those with lesser degrees may experience competition for available jobs. However, a life science degree also is useful for entry to occupations related to life science such as laboratory technology and the health care occupations. Employment in the life sciences is expected to increase faster than the average for all occupations over this period. In addition, some openings will occur as life scientists retire, die, or transfer to other occupations.

Employment in the life sciences will grow as a result of increased interest in preserving the natural environment and a continuing interest in medical research. Employment opportunities in industry and government should grow as environmental research and development increases and new laws and standards protecting the environment are enacted. Additional life science teachers will be needed if college and university enrollments increase as expected.

Earnings and Working Conditions

Life scientists receive relatively high salaries; their average earnings are more than twice those of nonsupervisory workers in private industry, except farming.

Beginning salary offers in private industry in 1976 averaged $10,900 a year for bachelor's degree recipients in agricultural science and $10,200 a year for bachelor's degree recipients in biological science.

In the Federal Government in 1977, life scientists having a bachelor's degree could begin at $9,303 or $11,523 a year, depending on their college records. Life scientists having the master's degree could start at $11,523 or $14,097, depending on their academic records or work experience. Those having the Ph. D. degree could begin at $17,056 or $20,442 a year. Agricultural and biological scientists in the Federal Government averaged $21,600 a year.

Earnings of all life scientists averaged about $20,300 a year in 1976, according to the limited data available. Life scientists who have the M.D. degree generally earn more than other life scientists but less than physicians in private practice.

Most life scientists work in well-lighted, well-ventilated, and clean laboratories. Some jobs, however, require working outdoors under extreme weather conditions, doing strenuous physical labor.

Sources of Additional Information

General information on careers in the life sciences is available from:

American Institute of Biological Sciences, 1401 Wilson Boulevard, Arlington, Va. 22209.

American Society for Horticultural Science, National Center for American Horticulture, Mt. Vernon, Va. 22121.

American Physiological Society, Education Office, 9650 Rockville Pike, Bethesda, Md. 20014.

Special information on Federal Government careers is available from:

U.S. Civil Service Commission, Washington Area Office, 1900 E St. NW., Washington, D.C. 20415.

MANUFACTURERS' SALES WORKERS

(D.O.T. 260. through 298.458)

Nature of the Work

Practically all manufacturers—whether they make computers or can openers—employ sales workers. Manufacturers' sales workers sell mainly to other businesses—factories, railroads, banks, wholesalers, and retailers. They also sell to hospitals, schools, libraries, and other institutions.

Most manufacturers' sales workers sell nontechnical products. They must be well informed about their firms' products and also about the special requirements of their customers. When sales workers visit firms in their territory, they use an approach adapted to the particular line of merchandise. A sales worker who handles crackers or cookies, for example, emphasizes the wholesomeness, attractive packaging, and variety of these products. Sometimes sales workers promote their products by displays in hotels and conferences with wholesalers and other customers.

Sales workers who deal in highly technical products, such as electronic equipment, often are called sales engineers or industrial sales workers. In addition to having a thorough knowledge of their firms' products, they must be able to help prospective buyers with technical problems. For example, they may try to determine the proper materials and equipment for a firm's manufacturing process. They then present this information to company officials and try to negotiate a sale, which may take many months. Often, sales engineers work with the research-and-development departments of their own companies to devise ways to adapt products to a customer's specialized needs. Sales workers who handle technical products sometimes train their customers' employees in the operation and maintenance of new equipment, and make frequent return visits to be certain that it is giving the desired service.

Although manufacturers' sales workers spend most of their time visiting prospective customers, they also do paperwork, including reports on sales prospects or customers' credit ratings. In addition, they must plan their work schedules, draw up lists of prospects, make appointments, handle some correspondence, and study literature relating to their products.

Manufacturer's sales worker takes order for camera equipment from department store photo supplies buyer.

Places of Employment

Over 360,000 people were manufacturers' sales workers in 1976. About 15,000 were sales engineers. Some work out of their company's home office, often located at a manufacturing plant. The majority, however, work out of branch offices, usually in big cities near prospective customers.

More sales workers are employed by companies that produce food products than by any other industry. Large numbers also work in the printing and publishing, chemical, fabricated metal products, and electrical and other machinery industries. Most sales engineers work for companies that produce heavy machinery, transportation equipment, fabricated metal products, and professional and scientific instruments.

Training, Other Qualifications, and Advancement

Although a college degree is increasingly desirable, the type and level of education a sales worker needs depend largely on the product and its market.

Manufacturers of nontechnical products often hire college graduates who have a degree in liberal arts or business administration. Some positions, however, require specialized training. Drug sales workers, also known as pharmaceutical detailers, usually need training at a college of pharmacy. Manufacturers of electrical equipment, heavy machinery, and some types of chemicals prefer to hire people who have studied engineering or chemistry. (Information on chemists, engineers, and others with the technical training suitable for work as manufacturers' sales workers is given elsewhere in the *Handbook*.)

Beginning sales workers may take specialized training before they start on the job. Some companies, especially those that manufacture complex technical products, have formal training programs that last 2 years or longer. In some of these programs, trainees rotate among jobs in several departments of the plant and office to learn all phases of production, installation, and distribution of the product. Other trainees take formal class instruction at the plant, followed by on-the-job training in a branch office under the supervision a field sales manager.

A pleasant personality and appearance, and the ability to meet and get along well with many types of people are important. Because sales workers may have to walk or stand for long periods or carry product samples, some physical stamina is necessary. As in most selling jobs, arithmetic skills are an asset.

Sales representatives who have good sales records and leadership ability may advance to sales supervisors, branch managers, or district managers. Those with managerial ability eventually may advance to sales manager or other executive positions; many top executive jobs in industry are filled by people who started as sales workers.

Because of frequent contact with business people in other firms, sales workers often are able to transfer to other jobs. Some go into business for themselves as independent representatives. Other experienced sales workers find opportunities in advertising and marketing research.

Employment Outlook

Employment in this field is expected to grow about as fast as the average for all occupations. Growth will occur because of the rising demand for technical products and the resulting need for trained sales workers. In addition, industrial firms, chain stores, and institutions that purchase large quantities of goods at one time frequently buy directly from the manufacturer. The need for sales workers will increase as manufacturers emphasize sales activities to compete for the growing number of these valuable accounts.

Earnings and Working Conditions

According to the limited information available, salaries for inexperienced sales workers ranged from $6,000 to over $24,000 a year in 1976, exclusive of commissions and bonuses. The highest starting salaries generally were paid by manufacturers of electrical equipment, food products, and rubber goods. The average experienced sales worker earned between $17,000 and $30,000 in 1976, depending upon the firm and its product. The highest paid sales workers sometimes earned upwards of $40,000 and $50,000.

Some manufacturing concerns pay experienced sales workers a straight commission, based on their dollar amount of sales (as in the case of independent representatives); others pay a fixed salary. The majority, however, use a combination of salary and commission, salary and bonus, or salary, commission, and bonus. Commissions vary according to the sales workers' efforts and ability, the commission rate, the location of their sales territory, and the type of product sold. Bonus payments may depend on individual performance, on performance of all sales workers in the group or district, or on the company's sales. Some firms pay annual bonuses; others offer bonuses as incentive payments on a quarterly or monthly basis.

Some manufacturers' sales workers have large territories and do considerable traveling. Others usually work in the neighborhood of their "home base." When on business trips, sales workers are reimbursed for expenses such as transportation and hotels. Some companies provide a car or pay a mileage allowance to sales workers who use their own cars.

Manufacturers' sales workers call at the time most convenient to customers and may have to travel at night or on weekends. Frequently, they spend evenings writing reports. However, some plan their schedules for time off when they want it. Most sales workers who are not paid a straight commission receive 2 to 4 weeks' paid vacation, depending on their length of service. They usually share in company benefits, including life insurance, pensions, and hospital, surgical, and medical benefits.

Sources of Additional Information

For more information on the occupation of manufacturers' sales worker, write:

Sales and Marketing Executives International, Career Education Division, 380 Lexington Ave., New York, N.Y. 10017.

Manufacturer's Agents National Association, P.O. Box 16878, Irvine, Cal. 92713.

MARKETING RESEARCH WORKERS

(D.O.T. 050.088)

Nature of the Work

Businesses require a great deal of information to make sound decisions on how to market their products. Marketing research workers provide much of this information by analyzing available data on products and sales. If additional information is required but not available, they conduct marketing surveys, by interviewing those likely to have the needed data. They also prepare sales forecasts and make recommendations on product design and advertising.

Most marketing research starts with the collection of facts from sources such as company records, published materials, and experts on the subject under investigation. For example, marketing research workers making sales forecasts may begin by studying the growth of sales volume in several different cities. This growth may then be traced to increases in population, size of the company's sales force, or amount of money spent on advertising. Other marketing research workers may study changes in the quantity of company goods on store shelves or make door-to-door surveys to get information on company products.

Marketing research workers often are concerned with customers' opinions and tastes. For example, to help decide on the design and price of a new line of television sets, marketing

Market research workers often test reactions to a company's product.

research workers may survey consumers to find out what styles and price ranges are most popular. This type of survey usually is supervised by marketing researchers who specialize in consumer goods; that is, merchandise sold to the general public. They may be helped by statisticians who select a group (or sample) to be interviewed and "motivational research" specialists who phrase questions to produce reliable information. Once the investigation is underway, the marketing researcher may supervise the interviewers as well as direct the office workers who tabulate and analyze the information collected.

Marketing surveys on products used by business and industrial firms may be conducted differently from surveys for consumer goods. Marketing researchers often conduct the interviews themselves to gather opinions of the product. They also may speak to company officials about new uses for it. They must therefore have specialized knowledge of both marketing techniques and the industrial uses of the product.

Places of Employment

About 25,000 full-time marketing research workers were employed in 1976. Most jobs for marketing research workers are found in manufacturing companies, advertising agencies, and independent research organizations. Large numbers are employed by stores, radio and television firms, and newspapers; others work for university research centers and government agencies. Marketing research organizations range in size from one-person enterprises to firms with a hundred employees or more.

New York City has a large number of marketing research workers. Many major advertising agencies, independent marketing organizations, and central offices of large manufacturers are located there. Another large concentration is in Chicago. However, marketing research workers are employed in many other cities as well—wherever there are central offices of large manufacturing and sales organizations.

Training, Other Qualifications, and Advancement

Although a bachelor's degree usually is sufficient for trainees, graduate education is necessary for many specialized positions in marketing research. Graduate study usually is required for advancement, and a sizable number of market researchers have a master's degree in business administration or other graduate degree as well as a bachelor's degree in marketing. Some people qualify for jobs through previous experience in other types of research; university teachers of marketing or statistics, for example, may be hired to head marketing research departments in business firms or advertising agencies.

Bachelor's programs in marketing and related fields, including courses in statistics, English composition, speech. psychology, and economics, are valuable preparation for work in marketing research. Some marketing research positions require specialized skills such as engineering, or substantial sales experience and a thorough knowledge of the company's products. Knowledge of data processing is helpful because of the increasing use of computers in sales forecasting, distribution, and cost analysis.

College graduates may find their first job in any of a number of places: in the market research department of a large company, with a research firm, in a government planning agency, or even in a university marketing department.

Trainees usually start as research assistants or junior analysts. At first, they may do considerable clerical work, such as copying data from published sources, editing and coding questionnaires, and tabulating survey returns. They also learn to conduct interviews and write reports on survey findings. As they gain experience, assistants and junior analysts may assume responsibility for specific marketing research projects, or advance to supervisory positions. An exceptionally able worker may become marketing research director or vice president for marketing and sales.

Either alone or as part of a team, marketing research workers must be able to analyze problems objectively and apply various techniques to their solution. As advisers to management, they should be able to write clear reports informing company officials of their findings.

Employment Outlook

Opportunities should be best for applicants with graduate training in marketing research or statistics. The growing complexity of marketing research techniques also may expand opportunities in this field for psychologists, economists, and other social scientists.

Marketing research employment rises as new products and services are developed, particularly when business activity and personal incomes are expanding rapidly. In periods of slow economic growth, however, the reduced demand for marketing services may limit the hiring of research workers.

Over the long run, population growth and the increased variety of goods and services that businesses and individuals will require are expected to stimulate a high level of marketing activity. As a result, employment of marketing research workers is expected to grow much faster than the average for other occupations through the mid-1980's.

Competition among manufacturers of both consumer and industrial products will make the appraising of marketing situations increasingly important. As techniques improve and statistical data accumulate, company officials are likely to turn more often to marketing research workers for information and advice.

Earnings and Working Conditions

Salaries for marketing research trainees were about $11,000 a year in 1976, according to the limited information available. Persons with master's degrees in business administration and related fields usually started with salaries around $15,000 a year. Starting salaries varied according to the type, size, and location of the firm as well as the exact nature of the position. Generally, though, starting salaries were somewhat higher and promotion somewhat slower than in other occupations requiring similar training.

Experienced workers such as senior analysts received salaries over $19,000 a year. Earnings were highest, however, for workers in management positions of great responsibility. Directors of marketing research earned well over $25,000 a year in 1976.

Marketing research workers usually work in modern, centrally located offices. Some, especially those employed by independent research firms, may travel for their work. Also, they may frequently work under pressure and for long hours to meet deadlines.

Sources of Additional Information

A pamphlet, "Careers in Marketing" (Monograph Series No. 4), may be purchased for $1.50 from:

American Marketing Association, 222 South Riverside Plaza, Chicago, Ill. 60606.

MATHEMATICIANS

(D.O.T. 020.088)

Nature of the Work

Mathematicians work with one of the oldest and most vital of all sciences. Mathematicians today are engaged in a wide variety of activities, ranging from the creation of new theories to the translation of scientific and managerial problems into mathematical terms.

Mathematical work falls into two broad classes: theoretical (pure) mathematics; and applied mathematics. However, these classes are not sharply defined and often overlap.

Theoretical mathematicians advance mathematical science by developing new principles and new relationships between existing principles of mathematics. Although they seek to increase basic knowledge without necessarily considering its practical use, this pure and abstract knowledge has been instrumental in producing many scientific and engineering achievements. For example, in 1854 Bernard Riemann invented a seemingly impractical non-Euclidian geometry that was to become part of Albert Einstein's theory of relativity. Years later, this theory contributed to the creation of atomic power.

Mathematicians in applied work use mathematics to develop theories, techniques, and approaches to solve practical problems in business, government, engineering, and the natural and social sciences. Their work ranges from analysis of the mathematical aspects of launching earth satellites to studies of the effects of new drugs on disease.

Much work in applied mathematics, however, is carried on by persons other than mathematicians. In fact, the number of workers who depend upon mathematical expertise is many times greater than the number actually designated as mathematicians.

Places of Employment

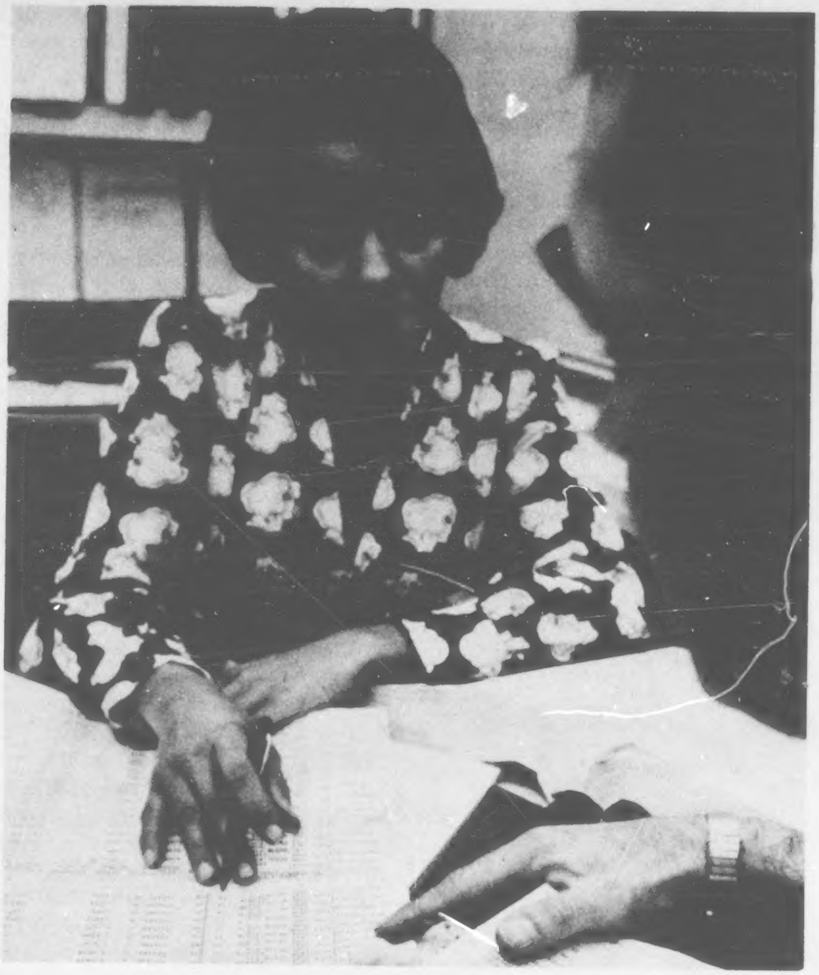
About 38,000 persons worked as mathematicians in 1976. Roughly three-fourths of all mathematicians worked in colleges and universities. Most were teachers; some worked mainly in research and development with few or no teaching duties.

Most other mathematicians worked in private industry and government. In the private sector, major employers were the aerospace, communications, machinery, and electrical equipment industries. The Department of Defense and the National Aeronautics and Space Administration employed most of the mathematicians working in the Federal Government.

Mathematicians work in all States, but are concentrated in those with large industrial areas and large college and university enrollments. Nearly half of the total are employed in seven States—California, New York, Massachusetts, Pennsylvania, Illinois, Maryland, and New Jersey. Of the total, one-fourth live in three metropolitan areas—New York City; Washington, D.C.; and Los Angeles-Long Beach, California.

Training, Other Qualifications, and Advancement

An advanced degree is the basic requirement for beginning teaching jobs, as well as for most research positions. In most colleges and uni-



Mathematicians should have a good knowledge of computer programming since most complex mathematical computation is done by computer.

versities, the Ph. D. degree is necessary for full faculty status.

Although the bachelor's degree may be adequate preparation for some jobs in private industry and government, employers usually require an advanced degree. Those bachelor's degree holders who find jobs usually assist senior mathematicians by performing computations and solving less advanced problems in applied mathematics. However, advancement often depends on achieving an advanced degree. Other bachelor's degree holders work as research or teaching assistants in colleges and universities while studying for an advanced degree.

The bachelor's degree in mathematics is offered by most colleges and universities. Mathematics courses usually required for a degree are analytical geometry, calculus, differential equations, probability and statistics, mathematical analysis, and modern algebra. A prospective college mathematics student should take as many mathematics courses as possible while still enrolled in high school.

More than 400 colleges and universities have programs leading to the master's degree in mathematics; about 150 also offer the Ph. D. In graduate school, students build upon the basic knowledge acquired in earlier studies. They usually concentrate on a specific field of mathematics, such as algebra, mathematical analysis, or geometry, by conducting research and taking advanced courses.

For work in applied mathematics, training in the field in which the mathematics will be used is very important. Fields in which applied mathematics is used extensively include physics, engineering, and operations research; of increasing importance are business and industrial management, economics, statistics, chemistry and life sciences, and the behavioral sciences.

Mathematicians should have a good knowledge of computer programming since most complex mathematical computation is done by computer.

Mathematicians need good reasoning ability, persistence, and the ability to apply basic principles to new types of problems. They must be able to communicate well with others since they often must listen to a nonmathematician describe a problem in general terms, and check and recheck to make sure they understand the mathematical solution that is needed.

Employment Outlook

Employment of mathematicians is expected to increase more slowly than the average for all occupations through the mid-1980's. Although the number of degrees granted in mathematics each year is expected to decline, the number of people seeking employment is expected to exceed job openings. As a result, persons seeking employment as mathematicians are likely to face keen competition throughout the period.

Theoretical mathematicians, who have traditionally found jobs in colleges and universities, are expected to experience the most difficulty in finding employment because colleges and universities are not expected to increase their employment of mathematicians much, if any, beyond present levels.

Holders of advanced degrees in applied mathematics should have the least difficulty in finding satisfactory employment. Although some limited opportunities may be available to theoretical mathematicians in nonacademic areas, most employers will seek applied mathematicians who are capable of applying their special mathematical skills to practical problems. Private industry and governmental agencies will need applied mathematicians for work in operations research, numerical analysis, computer systems programming, applied mathematical physics, market research and commercial surveys, and as consultants in industrial laboratories. Work in applied mathematics requires both a high degree of mathematical competence and a knowledge of the field of application.

Although mathematician jobs may be difficult to obtain, college graduates with degrees in mathematics should find their background helpful for careers in other areas. Many jobs rely heavily on the application of mathematical theories and methods. Mathematics majors are likely to find openings in statistics, actuarial work, computer programming, systems analysis, economics, engineering, and physical and life sciences. Employment opportunities in these fields will probably be best for those who combine a major in mathematics with a minor in one of these subjects.

New graduates may also find openings as high school mathematics teachers after completing professional education courses and other requirements for a State teaching certificate. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings and Working Conditions

In 1976, mathematicians earned average salaries over twice as high as the average for nonsupervisory workers in private industry, except farming. Starting salaries for mathematicians with a bachelor's degree averaged about $11,500 a year. Those with a master's degree could start at about $14,300 annually. Salaries for new graduates having the Ph. D., most of whom had some experience, averaged over $20,000.

In the Federal Government in 1977, mathematicians having the bachelor's degree and no experience could start at either $9,303 or $11,523 a year, depending on their college records. Those with the master's degree could start at $14,097 or $17,056; and persons having the Ph. D. degree could begin at either $17,056 or $20,442. The average salary for all mathematicians in the Federal Government was about $23,100 in 1977.

Salaries paid to college and university mathematics teachers are comparable to those for other faculty members. (See statement on college and university teachers elsewhere in the *Handbook*.)

Sources of Additional Information

Several brochures are available that give facts about the field of mathematics, including career opportunities, professional training, and colleges and universities with degree programs.

Seeking Employment in the Mathematical Sciences is available for 50 cents from:

American Mathematical Society, P.O. Box 6248, Providence, R.I. 02940.

Professional Opportunities in Mathematics (50 cents) and *Guide Book to Departments in the Mathematical Sciences* ($3.00) are provided by:

Mathematical Association of America, 1225 Connecticut Ave. NW., Washington, D.C. 20036.

For specific information on careers in applied mathematics, contact:

Society for Industrial and Applied Mathematics, 33 S. 17th St., Philadelphia, Pa. 19103.

For Federal Government career information, contact any regional office of the U.S. Civil Service Commission or:

Interagency Board of U.S. Civil Service Examiners, 1900 E St. NW., Washington, D.C. 20415.

MEDICAL LABORATORY WORKERS

(D.O.T. 078.128, .168, .281, and .381)

Nature of the Work

Laboratory tests play an important part in the detection, diagnosis, and treatment of many diseases. Medical laboratory workers, often called clinical laboratory workers, include three levels: medical technologists, technicians, and assistants. They perform tests under the general direction of pathologists (physicians who diagnose the causes and nature of disease) and other physicians, or scientists who specialize in clinical chemistry, microbiology, or the other biological sciences. Medical laboratory workers analyze the blood, tissues, and fluids in the human body by using precision instruments such as microscopes and automatic analyzers.

Medical technologists, who require 4 years of postsecondary training, perform complicated chemical, microscopic, and bacteriological tests. These may include chemical tests to determine, for example, the blood cholesterol level, or microscopic examination of the blood to detect the presence of diseases such as leukemia. Technologists microscopically examine other body fluids; make cultures of body fluid or tissue samples to determine the presence of bacteria, parasites, or other microorganisms; and analyze the samples for chemical content or reaction. They also may type and cross-match blood samples.

Technologists in small laboratories often perform many types of tests. Those in large laboratories usually specialize in areas such as microbiology, parasitology, biochemistry, blood banking, hematology (the study of blood cells), and nuclear medical technology (the use of radioactive isotopes to help detect diseases).

Most medical technologists conduct tests related to the examination and treatment of patients and are called on to display independent judgment. Some do research, develop laboratory techniques, teach, or perform administrative duties.

Medical laboratory technicians, who generally require 2 years of postsecondary training, perform a wide range of tests and laboratory procedures that require a high level of skill but not the in-depth knowledge of highly trained technologists. Like technologists, they may work in several areas or specialize in one field.

Medical laboratory assistants, who generally have a year of formal training, assist medical technologists and technicians in routine tests and related work that can be learned in a relatively short time. In large laboratories, they may concentrate in one area of work. For example, they may identify abnormal blood cells on slides. In addition to performing routine tests, assistants may store and label plasma; clean and sterilize laboratory equipment, glassware, and instruments; prepare solutions following standard laboratory formulas and procedures; keep records of tests; and identify specimens.

Places of Employment

About 240,000 persons worked as medical laboratory workers in 1976. Most medical laboratory personnel work in hospital laboratories. Others work in independent laboratories, physicians' offices, clinics, public health agencies, pharmaceutical firms, and research institutions. These places are concentrated in larger cities and populous States.

In 1976, Veterans Administration hospitals and laboratories employed about 2,400 medical technologists and about 2,000 medical laboratory technicians and assistants. Others worked for the Armed Forces and the U.S. Public Health Service.

Training, Other Qualifications, and Advancement

The minimum educational requirement for a beginning job as a medical technologist usually is 4 years of college training including completion of a specialized training program in medical technology.

Most medical laboratory personnel work in hospitals.

Undergraduate work includes courses in chemistry, biological sciences, and mathematics. These studies give the technologist a broad understanding of the scientific principles underlying laboratory work. Specialized training usually requires 12 months of study and includes extensive laboratory work. In 1976, about 700 hospitals and schools offered programs accredited by the American Medical Association. These programs were affiliated with colleges and universities; a bachelor's degree usually is awarded upon completion. A few programs require a bachelor's degree for entry.

Many universities also offer advanced degrees in medical technology and related subjects for technologists who plan to specialize in a certain area of laboratory work or in teaching, administration, or research.

Medical laboratory technicians employed in 1976 got their training in a variety of educational settings. Many attended junior or 4-year colleges and universities for 2 years. Some were trained in the Armed Forces. Many technicians received training in private or nonprofit vocational and technical schools. In 1976 the American Medical Association accredited 38 of these programs and the Accrediting Bureau of Medical Laboratory Schools accredited 36.

Most medical laboratory assistants employed in 1976 were trained on the job. In recent years, however, an increasing number have studied in 1-year training programs conducted by hospitals, junior colleges in cooperation with hospitals, or vocational schools. In 1976, the American Medical Association accredited 153 training programs for medical laboratory assistants. Applicants to these programs should be high school graduates or have an equivalency diploma with courses in science and mathematics. The programs include classroom instruction and practical training in the laboratory. They often begin with a general orientation to the clinical laboratory followed by courses in bacteriology, serology, parasitology, hematology, clinical chemistry, blood banking, and urinalysis.

After the successful completion of the appropriate examinations, medical technologists may be certified as Medical Technologists, MT (ASCP), by the Board of Registry of the American Society of Clinical Pathologists; Medical Technologists, MT, by the American Medical Technologists; or Registered Medical Technologists, RMT, by the International Society of Clinical Laboratory Technology. These organizations also certify technicians. Laboratory assistants are certified by the American Society of Clinical Pathologists.

Medical technologists and technicians must be licensed in Alabama, California, Florida, Georgia, Hawaii, Illinois, Nevada, Pennsylvania, Tennessee, New York City, and Puerto Rico. Requirements for licensure include a written examination in some States.

Accuracy, dependability, and the ability to work under pressure are important personal characteristics for a medical laboratory worker. Manual dexterity and normal color vision are highly desirable.

Persons interested in medical laboratory careers should use considerable care in selecting a training program. They should get information about the kinds of jobs obtained by graduates, educational costs, the accreditation of the school, the length of time the training program has been in operation, instructional facilities, and faculty qualifications.

Technologists may advance to supervisory positions in certain areas of laboratory work, or, after several years' experience, to administrative medical technologist in a large hospital. Graduate education in one of the biological sciences, chemistry, management, and education usually speeds advancement. Technicians can advance to technologists by getting additional education and experience. Similarly, assistants can become technicians by acquiring more education and experience.

Employment Outlook

Employment opportunities for medical laboratory workers are expected to be favorable through the mid-1980's. Employment of these workers is expected to expand faster than the average for all occupations as physicians make wider use of laboratory tests in routine physical checkups and in the diagnosis and treatment of disease. Indirectly influencing growth in the field are population growth, greater health consciousness, and expansion of prepayment programs for medical care that make it easier for people to pay for services.

The use of automated laboratory test equipment is expected to lead to an increase in the number of medical laboratory technicians and assistants relative to technologists. Through technological advances, technicians and assistants can operate equipment to perform tests which previously required the skill of a technologist.

Technologists will be needed to fill supervisory positions in all laboratories. Also, some will be needed in laboratories where they are required by State licensing authorities or third-party health insurance regulations, and in laboratories not using the new automated equipment.

In addition to openings resulting from growth, many jobs will become available each year because of the need to replace medical laboratory workers who die, retire, or leave the field for other reasons.

Earnings and Working Conditions

Salaries of medical laboratory workers vary depending on the employer and geographic location. In general, medical laboratory workers employed on the West Coast and in large cities received the highest salaries.

Starting salaries for medical technologists in hospitals and medical centers averaged about $10,600 a year in 1976, according to a survey conducted by the University of Texas Medical Branch. Beginning salaries for laboratory technicians averaged about $8,700 a year in 1976; for assistants, about $7,600.

The Federal Government paid newly graduated medical technologists with bachelor's degrees starting salaries of $9,303 a year in 1977. Those having experience, superior academic achievement, or a year of graduate study entered at $11,523. The Federal Government paid medical laboratory assistants and technicians starting salaries ranging from $5,810 to $9,303 a year in 1977, depending on the amount and type of education and experience. Medical technologists in the Federal Government averaged $13,600 a year and medical technicians $11,800 a year, in 1977.

Medical laboratory personnel generally work a 40-hour week. In hospitals, they can expect some night and weekend duty. Hospitals normally provide vacation and sick leave benefits; some have retirement plans.

Laboratories generally are well-lighted and clean. Although unpleasant odors and specimens of many kinds of diseased tissue often are present, few hazards exist if proper methods of sterilization and handling of specimens, materials, and equipment are used.

Sources of Additional Information

Information about education and training for medical technologists, technicians, and laboratory assistants meeting standards recognized by the American Medical Association, the U.S. Office of Education, or both, as well as career information on these fields of work, is available from:

American Society of Clinical Pathologists, Board of Registry, P.O. Box 4872, Chicago, Ill. 60680.

American Society for Medical Technology, 5555 W. Loop South, Bellaire, Tex. 77401.

American Medical Technologists, 710 Higgins Rd., Park Ridge, Ill. 60068.

Accrediting Bureau of Medical Laboratory Schools, Oak Manor Office, 29089 U.S. 20 West, Elkhart, Ind. 46514.

For information about other technician training programs, contact:

International Society for Clinical Laboratory Technology, 805 Ambassador Building, 411 N. Seventh St., St. Louis, Mo. 63101.

For a list of training programs for medical technologists, technicians, and assistants that are approved by the American Medical Association, write:

Department of Allied Health Evaluation, American Medical Association, 535 North Dearborn St., Chicago, Ill. 60610.

For a list of training programs for medical laboratory technicians accredited by the Accrediting Bureau of Medical Laboratory Schools, write:

Secretary-ABMLS, 29089 U.S. 20 West, Elkhart, Ind. 46514.

Information about employment opportunities in Veterans Administration hospitals is available from the Office of Personnel (O54E), Veterans Administration, Washington, D.C. 20420.

Information about clinical and research employment opportunities with the National Institutes of Health is available from the Clinical Center, National Institutes of Health, Bethesda, Maryland 20014.

Medical record administrators develop systems for documenting, storing, and retrieving medical information.

MEDICAL RECORD ADMINISTRATORS

(D.O.T. 100.388)

Nature of the Work

All health care institutions keep records that contain medical information on each patient, including case histories of illnesses or injuries, reports on physical examinations, X-rays and laboratory tests, doctors' orders and notes, and nurses' notes. These records are necessary for correct and prompt diagnosis and treatment of illnesses and injuries. They also are used for research, insurance claims, legal actions, evaluation of treatment and medications prescribed, and in the training of medical personnel. Medical information in hospitals also is used to evaluate patient care provided in the hospital and as a basis for health care planning for the community.

Medical record administrators direct the activities of the medical record department and develop systems for documenting, storing, and retrieving medical information. They supervise the medical record staff, which processes and analyzes records and reports on patients' illnesses and treatment. They train members of the medical record staff for specialized jobs, compile medical statistics required by State or national health agencies, and assist the medical staff in evaluations of patient care or research studies. Medical record administrators serving as department heads are a part of the hospital management staff and participate fully in management activities. As the administrators responsible for the medical information system, they may be required to testify in court about records and record procedures.

The size and type of institution affect the duties and amount of responsibility assigned to medical record administrators. In large hospitals, chief medical record administrators supervise other medical record administrators, technicians, and clerks. Smaller hospitals may employ only two or three persons in the medical record department; in nursing homes usually one person keeps the medical records. In these cases a consulting medical record administrator usually advises technical and clerical personnel performing medical record functions.

Places of Employment

Most of the 12,300 medical record administrators employed in 1976 worked in hospitals. The remainder worked in clinics, nursing homes, State and local public health departments, and medical research centers. Some health insurance companies also employ medical record administrators to help determine liability for payment of their clients' medical fees. Some medical record administrators work for firms that manufacture equipment for recording and processing medical data and develop and print health insurance and medical forms. Many small health care facilities hire medical record administrators as consultants.

Training, Other Qualifications, and Advancement

Preparation for a career as a medical record administrator is offered in specialized programs in colleges and universities. Most programs last 4 years and lead to a bachelor's degree in medical record administration. However, concentration in medical record administration begins in the third or fourth year of study, making transfer from a junior college possible. One-year certificate programs also are available for those who already have a bachelor's degree and required courses in the liberal arts and biological sciences. In 1977, there were 41 programs in medical record administration approved by the Council on Medical Education of the American Medical Association and the American Medical Record Association (AMRA). High school courses that are useful include health, business administration, mathematics, and biology.

Training for medical record administrators includes both classroom instruction and practical experience. Anatomy, physiology, fundamentals of medical science, medical terminology, and medical record science are among the required scientific courses. In addition, management courses such as hospital organization and administration, health law, statistics, data processing, and computer science are part of the curriculum. Experience in the medical record departments of hospitals provides students with a practical background in applying standardized medical record practices, compiling statistical reports, analyzing data, and organizing medical record systems.

Graduates of approved schools in medical record administration are eligible for the national registration examination given by AMRA. Passing this examination gives professional recognition as a Registered Record Administrator (RRA). There were about 5,000 employed RRA's in 1976, according to AMRA.

Medical record administrators must be accurate and interested in detail. They also must be able to communicate clearly in speech and writing. Because medical records are confidential, medical record administrators must be discreet in processing and releasing information. Supervisors must be able to organize and analyze work procedures and to work effectively with other hospital personnel.

Medical record administrators with some experience in smaller health facilities may advance to positions as department heads in large hospitals or to higher level positions in hospital administration. Some coordinate the medical record departments of several small hospitals. Others move on to medical record positions in health agencies. Many teach in the expanding programs for medical record personnel in 2- and 4-year colleges and universities.

Employment Outlook

Employment opportunities for graduates of approved medical record administrator programs are expected to be good through the mid-1980's. Employment is expected to grow faster than the average for all occupations, with the increasing use of health facilities as more and more people are covered by health insurance. The detailed information required by third-party payers such as insurance companies and Medicare also will cause growth in the occupation. More consultants will be needed to standardize health records in outpatient clinics, community health centers, nursing homes, and home care programs. The importance of medical records in research and the growing use of computers to store and retrieve medical information also should increase the demand for qualified medical record administrators to develop new medical information systems. Part-time employment opportunities also should be available in teaching, in research, and in consulting work for health care facilities.

Earnings and Working Conditions

The salaries of medical record administrators are influenced by the location, size, and type of employing institution, as well as by the duties and responsibilities of the position. The average starting salary for medical record administrators in 1976 was $12,312 a year, according to a national survey conducted by the University of Texas Medical Branch at Galveston. Top salaries averaged $14,916 a year, with some earning as much as $27,612.

Newly graduated medical record administrators employed by the Federal Government generally started at $9,303 a year in 1977; those having bachelor's degrees and good academic records were eligible to begin at $11,523. In 1977, the Federal Government paid experienced medical record administrators average salaries of $15,700 a year.

Medical record administrators usually work a regular 36- to 40-hour week and receive paid holidays and vacations.

Sources of Additional Information

Information about approved schools and employment opportunities is available from:

American Medical Record Association, John Hancock Center, Suite 1850, 875 N. Michigan Ave., Chicago, Ill. 60611.

MERCHANT MARINE OFFICERS

Nature of the Work

Every ship has jobs of such importance to its safe operation that the persons doing them are identified as having special responsibilities. These persons are the ships officers.

In command of every oceangoing vessel is the *captain* or *master* (D.O.T. 197.168) who is the shipowner's sole representative. The captain has complete authority and responsibility for the ship's operation and the safety of the crew, passengers, cargo, and vessel.

In addition, while in port, the captain may serve as the shipowner's agent in conferring with custom officials, and in some case may act as paymaster for the ship. Although not technically members of a specific department, captains generally are associated with the deck department, from whose ranks they have been promoted.

Deck Department. Deck officers or "mates," as they are traditionally called, direct movement of the ship and maintenance of the deck and hull. They maintain the authorized speed and course; plot the vessel's position; post lookouts for other

The captain has complete authority and responsibility for the ship's operation.

ships; record information in the "log" of the voyage; and immediately notify the captain of any unusual occurrences. To comply with coast guard regulations for ensuring the safe and efficient operation of ships, deck officers must be familiar with modern navigational equipment, such as sonar, radar, and radio directional finders.

The *chief mate* (D.O.T. 197.133), also known as the first mate or chief officer, is the captain's key assistant in assigning duties to the deck crew and maintaining order and discipline. The chief mate also plans and supervises the loading and unloading of cargo, and assists the captain in taking the ship in and out of port. On some ships, the chief mate also may be in charge of first-aid treatment.

By tradition, the *second mate* (D.O.T. 197.133) is the navigation officer. The second mate sees that the ship is provided with the necessary navigation charts and that navigation equipment is maintained properly.

Third mates (D.O.T. 197.133), the most junior-rated deck officers act as signal officers and are in charge of all signaling equipment. They also assist in the supervision of cargo loading and unloading. The third mate frequently inspects lifesaving equipment to be sure it is ready for use in fire, shipwreck, or other emergencies.

Engine Department. Marine engineers operate and maintain all engines and machinery aboard ship. The *chief engineer* (D.O.T. 197.130) supervises the engine department, and is responsible for the efficient operation of engines and other mechanical equipment. The chief engineer oversees the operation of the main powerplant and auxiliary equipment while the vessel is underway and keeps records of equipment performance and fuel consumption.

The *first assistant engineer* (D.O.T. 197.130) supervises engineroom personnel and directs operations such as starting, stopping, and controlling the speed of the main engines. The first assistant engineer also oversees and inspects the lubrication of engines, pumps, generators, and other machinery and, with the chief engineer, directs all types of repairs.

The *second assistant engineer* (D.O.T. 197.130) has charge of the boiler and associated equipment such as the water-feed system and pumps. The second assistant engineer also makes sure proper steam pressure and oil and water temperatures are maintained and supervises the cleaning of boilers.

The *third assistant engineer* (D.O.T. 197.130) supervises the operation and maintenance of the lubrication system and a variety of other engineroom equipment. Some third assistant engineers are responsible for the electrical and refrigeration systems aboard ships.

Other officers. A ship keeps contact with the shore and other vessels through its *radio officer* (D.O.T. 193.282), who also maintains radio equipment. These officers send and receive messages by voice or Morse code. They periodically receive and record time signals, weather reports, position reports, and other information. Radio officers also may maintain depth recording equipment and electronic navigation equipment.

Some freighters and all passenger vessels carry *pursers* (D.O.T. 197.168). The purser or staff officer does the extensive paperwork that is required before a ship enters or leaves a port. They prepare payrolls and assist passengers as required. In recent years, the Staff Officers Association has established a program to train pursers to act also as physician's assistants. This instruction is designed to improve the medical care aboard freighters and tankers and facilitate U.S. Public Health Service clearance when a ship arrives in port. All passenger ships must carry licensed doctors and nurses.

Places of Employment

About 13,300 officers were employed aboard U.S. oceangoing vessels during 1976. Deck officers and engineering officers accounted for more than four-fifths of the total, and radio officers made up most of the remainder. Due to long vacations and other breaks in service such as those resulting from illness there are about two officers employed for every job on a ship.

About two-thirds of the officers were aboard freighters and most of the remainder were aboard tankers. Only a small percentage were on passenger vessels.

Training, Other Qualifications, and Advancement

Applicants for an officer's license in the deck or engineering departments of oceangoing vessels must meet certain legal requirements. Captains, chief and second mates, and chief and first assistant engineers must be at least 21 years old. The minimum age for third mates, third assistant engineers, and radio operators is 19. In addition, applicants must present proof of U.S. citizenship and obtain a U.S. Public Health Service certificate attesting to their vision, color perception, and general physical condition.

Besides legal and medical requirements, candidates must also have at least 3 years of appropriate sea experience or be a graduate of an approved training program. Deck officer candidates must pass Coast Guard examinations that require extensive knowledge of navigation, cargo handling, and deck department operations. Marine engineering officer candidates must demonstrate indepth knowledge of propulsion systems, electricity, plumbing and steam fitting, metal shaping and assembly, and ship structure. To advance to higher ratings, officers must pass progressively more difficult examinations.

For a Coast Guard license as a radio officer, applicants must have a first or second-class radiotelegraph operator's license issued by the Federal Communications Commission. For a license to serve as the sole radio operator aboard a cargo vessel, the Coast Guard also requires 6 months of radio experience at sea.

Unlike most professions, no education requirements have been established for officers. A sailor with 3 years' experience in the deck or engine department may apply for either a third mate's license or for a third assistant engineer's license. However, because of the complex machinery, and navigational and electronic equipment on modern ships, formal training usually is needed to pass the Coast Guard's examination for these licenses.

The fastest and surest way to become a well-trained officer is through an established training program. Such programs are available at the U.S. Merchant Marine Academy at Kings Point, N.Y., and at six State merchant marine academies: California Maritime Academy, Vallejo, Calif.; Great Lakes Maritina Academy Traverse City, Michigan; Maine Maritime Academy, Castine, Maine; Massachusetts Maritime Academy, Hyannis, Mass.; Texas Maritime Academy, Galveston, Tex.; and State University of New York Maritime College, Fort Schuyler, New York, N.Y. About 500 students graduate each year from these schools; about one-half are trained as deck officers and one-half as marine engineers. Admission to the U.S. Merchant Marine Academy is through nomination by a member of Congress, whereas entrance to the other academies is made through written application directly to the school.

Most of the academies offer 4-year programs in nautical science or marine engineering, which include courses such as navigation, mathematics, electronics, propulsion systems, electrical engineering, naval architecture, languages, history, and shipping management, as well as practical experience at sea. After Coast Guard examinations are passed, licenses are issued for either third mate or third assistant engineer. In addition, graduates may receive commissions as ensigns in the U.S. Naval Reserve.

Because of their thorough grounding in theory and its practical application, academy graduates are in the best position to move up to master and chief engineer ratings. Their well-rounded education also helps qualify them for shoreside jobs such as marine superintendent, operating manager, design engineers, naval architects, or shipping executive.

The U.S. Merchant Marine Academy now selects about 15 percent of the approximately 250 persons who enter the academy each year to be trained as "omnicompetent" officers. They are taught both navigational and technical skills so they can work in either the deck or engine department. Graduates of the U.S. Merchant Marine Academy have an obligation to serve a minimum of 3 years as officers in the merchant marine or in the military service of the United States.

A number of trade unions in the maritime industry provide officer training. These unions include the International Organization of Masters, Mates and Pilots; the Seafarers' International Union of North America; the Brotherhood of Marine Officers; and the National Marine Engineers' Beneficial Association (MEBA). However due to a crowded job market in recent years, all but the MEBA-operated Calhoon Engineering School in Baltimore, Md., have restricted training programs to upgrading of officers already licensed. The Calhoon School, which produces about 90 graduates every year, offers a third assistant engineer's license. The program consists of both classroom instruction and sea experience and provides free room, board, medical care, and text books in addition to a monthly grant. Trainees must agree to serve at least 3 years in the merchant marine after the 3-year training period.

Advancement for deck and engine officers is along well-defined lines and depends primarily upon specified sea experience, passing a Coast Guard examination, and leadership ability. Deck officers start as third mates. After 1 year's sea service they are eligible to take a second mate examination. A second mate may apply for a chief mate's license after 1 year of sea service. Officers in the engine department start as third assistant engineers. After 1 year of service, they may apply for a second assistant's license and finally a chief engineer's license.

Employment Outlook

Employment of ship's officers is expected to increase more slowly than the average for all occupations through the mid-1980's.

Since World War II, the number of vessels in our merchant marine has declined steadily as the owners of American ships have registered them outside the country. The transfers occurred because ships registered in the United States must employ American crews and, because of their higher wages, cost about twice as much to operate as ships registered abroad and manned with foreign crews. The incentive of obtaining greater profits by lowering operating costs prompted many owners to register their ships outside the U.S.

Little further decline in the number of ships is expected, however, because the Federal Government has taken steps to insure that ships registered in the U.S. and operated by American crews are available to transport essential cargo. To maintain this capability, the Government pays the difference in wages if U.S. crews are used, and helps pay for the construction or purchase of new ships. Some job openings will occur as a result of the need to replace experienced workers who retire, die or take shoreside employment. Replacement needs are relatively high because ships' officers are somewhat older, on the average, than workers in other occupations and the liberal pension plans offered by the merchant marine industry encourage early retirement. Also, some officers find they prefer the stability of shoreside employment.

Job opportunities are expected to become more favorable in the 1980's than in the near future as the balance between the supply and demand for officers becomes more favorable.

Since maritime unions control a majority of jobs, graduates from union training programs have the best opportunities to obtain jobs aboard ocean-going vessels. However, graduates of merchant marine academies who cannot find jobs on merchant ships generally have little trouble finding jobs in related fields. For example, trained officers are needed on oceanographic research vessels, on vessels that carry supplies to offshore oil drilling rigs, and on dredges operated by the Army Corps of Engineers. Others find jobs with the maritime industry.

Earnings and Working Conditions

Earnings of officers depend upon their rank and the type of ship. Wages are highest on large ships. The accompanying tabulation shows monthly base wages for officers aboard an average freighter in 1976. Additional payments for overtime or for assuming extra responsibilities generally average about 50 percent of base pay. For example, a second mate with a monthly base pay of $1,278 may regularly earn about $1,917 each month.

Officers and their dependents enjoy substantial pension and welfare benefits. Vacations range from 90 to 180 days a year. Officers with 20 years of service have the option of a monthly pension of $325 or 37 1/2 percent of their monthly rate of pay. Those who have 25 years of service are eligible for $425 a month or 50 percent of their monthly rate. Officers forced to retire prematurely due to a permanent disability receive partial pensions. Comprehensive medical care and hospitalization are provided for officers and their families through employer or union programs.

	Base *pay* [1]
Captain	$3,717
Chief engineer	3,158
First assistant engineer	1,888
First mate	1,802
Radio officer	1,604
Second assistant engineer	1,338
Second mate	1,278
Third assistant engineer	1,202
Third mate	1,147
Purser	1,055

[1] East Coast wages in June 1976 aboard a 12,000–17,000 power ton single screw ship.

The workweek aboard ship is considerably different from the workweek on shore. At sea, most officers are required to work 7 days a week. Generally, they work two 4-hour watches (shifts) during every 24-hour period and have 8 hours off between each watch. Some officers work 8 hours a day, Monday through Friday. All officers are paid overtime for work over 40 hours a week. When the ship is in port, the basic workweek is 40 hours for all crewmembers.

The duties aboard ship are hazardous compared to other industries. At sea, there is always the possibility of injuries from falls or the danger of fire, collision, or sinking.

Almost 90 percent of all officers belong to maritime unions. The two largest are the International Organization of Masters, Mates and Pilots, representing deck officers, and the National Marine Engineers' Beneficial Association, representing engineering officers. The Brotherhood of Marine Officers represents deck and engine officers on some ships. The Staff Officers Association and the Marine Staff Officers Association represents pursers aboard certain freighters. Radio officers are represented by the American Radio Association and the Radio Officers Union. In addition, a number of independent unions organize officers on tankers. Officers' unions may require initiation fees as high as $4,000.

Sources of Additional Information

For general information about merchant marine officer's jobs, write to:

Office of Maritime Manpower, Maritime Administration, U.S. Department of Commerce, Washington, D.C. 20235.

Information about job openings, qualifications for employment, wage scales, and other particulars is available from local maritime officers' unions. If no maritime union is listed in the local telephone directory, contact:

International Organization of Masters, Mates and Pilots, 39 Broadway, New York, N.Y. 10006.

National Marine Engineers' Beneficial Association, 17 Battery Pl., New York, N.Y. 10004.

METEOROLOGISTS

(D.O.T. 025.088)

Nature of the Work

Meteorology is the study of the atmosphere, which is the air that surrounds the earth. Meteorologists describe and try to understand the atmosphere's physical characteristics, motions, and processes, and determine the way the behavior of the atmosphere affects the rest of our physical environment. The best known application of this knowledge is in understanding and forecasting the weather. Meteorological research is also applied in many other areas not directly related to weather forecasting such as understanding and solving air pollution problems and studying trends in the earth's climate.

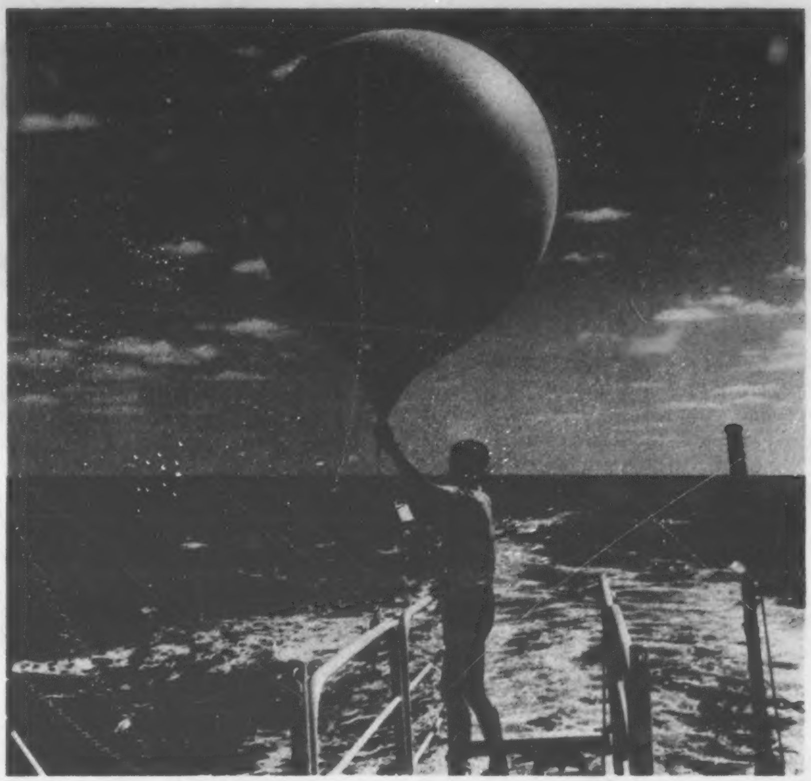
Meteorologists who specialize in forecasting the weather, known professionally as *synoptic meteorologists*, are the largest group of specialists. They study current weather information, such as air pressure, temperature, humidity, and wind velocity, in order to make short-range and long-range predictions. Their data come from weather satellites and observers in many parts of the world. Although some forecasters still prepare and analyze weather maps, most data now are plotted and analyzed by computers.

Some meteorologists are engaged in basic and applied research. For example, *physical meteorologists* study the chemical and electrical properties of the atmosphere. They do research on the effect of the atmosphere on transmission of light, sound, and radio waves, as well as study factors affecting formation of clouds, rain, snow, and other weather phenomena. Other meteorologists, known as *climatologists*, study climatic trends and analyze past records on wind, rainfall, sunshine, and temperature to determine the general pattern of weather that makes up an area's climate. These studies are useful in planning heating and cooling systems, designing buildings, and aiding in effective land utilization.

Other meteorologists apply their knowledge in the study of the relationship between weather and specific human activities, biological processes, and agricultural and industrial operations. For example, they may make weather forecasts for individual companies, or may work on problems such as smoke control and air pollution abatement.

About one-third of all civilian meteorologists work primarily in weather forecasting, and another one-third work in research and development. Almost one-fifth of all civilian meteorologists are in administrative or management positions.

Some meteorologists teach or do research—frequently combining both activities—in colleges and universities. In colleges without separate departments of meteorology, they may teach geography, mathematics, physics, chemistry, or geology, as well as meteorology.



Meteorologist sending weather balloon aloft.

Places of Employment

About 5,500 persons worked as meteorologists in 1976. In addition to these civilian meteorologists, thousands of members of the Armed Forces did forecasting and other meteorological work.

The largest employer of civilian meteorologists was the National Oceanic and Atmospheric Administration (NOAA), where over 1,800 worked at stations in all parts of the United States and in a small number of foreign areas. The Department of Defense employed over 200 civilian meteorologists.

Almost 2,000 meteorologists worked for private industry. Commercial airlines employed several hundred to forecast weather along flight routes and to brief pilots on atmospheric conditions. Others worked for private weather consulting firms, for companies that design and manufacture meteorological instruments, and for firms in aerospace, insurance, engineering, utilities, radio and television, and other industries.

Colleges and universities employed over 1,300 meteorologists in research and teaching. A few worked for State and local governments and for nonprofit organizations.

Although meteorologists work in all parts of the country, nearly one-fifth live in just two States—California and Maryland. Almost one-tenth of all meteorologists work in the Washington, D.C. area.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in meteorology is the usual minimum requirement for beginning jobs in weather forecasting. However, a bachelor's degree in a related science or engineering, along with some courses in meteorology, is acceptable for some jobs. For example, the Federal Government's minimum requirement for beginning jobs is a bachelor's degree with at least 20 semester hours of study in meteorology and courses in physics and mathematics, including calculus. However, employers prefer to hire those with an advanced degree, and an advanced degree is increasingly necessary for advancement.

For research and college teaching and for many top-level positions in other meteorological activities, an advanced degree, preferably in meteorology, is essential. However, people with graduate degrees in other sciences also may qualify if they have advanced courses in meteorology, physics, mathematics, and chemistry.

In 1976, 44 colleges and universities offered a bachelor's degree in meteorology or atmospheric science; 59 schools offered advanced degrees. Many other institutions offered some courses in meteorology.

The Armed Services give and support meteorological training, both undergraduate education for enlisted personnel and advanced study for officers.

NOAA has a program under which some of its meteorologists attend college for advanced or specialized training. College students can obtain summer jobs with this agency or enroll in its cooperative education program in which they work at NOAA part of the year and attend school part of the year. In addition to helping students finance their education, this program gives them experience valuable for finding a job when they graduate.

Beginning meteorologists often start in jobs involving routine data collection, computation, or analysis. Experienced meteorologists may advance in academic rank or to various supervisory or administrative jobs. A few very well qualified meteorologists with a background in science, engineering, and business administration may establish their own weather consulting services.

Employment Outlook

Job opportunities for meteorologists should be favorable through the mid-1980's. Although the number of openings created by growth in the occupation and replacement needs is not expected to be large, the number of persons obtaining degrees in meteorology also is small. If trends in the number of degrees granted continue, the number of people seeking entry to the field will about equal requirements.

Employment in the field, as a whole, is expected to increase about as fast as the average for all occupations. Employment of meteorologists in industry and in weather consulting firms is expected to grow as private industry realizes the importance of meteorology to understanding and preventing air pollution. Many companies are also recognizing the value of having their own weather forecasting and meteorological services which can be tailored to fit their needs. There also should be some openings in radio and television as stations increasingly rely on their own meteorologists to prepare and deliver their weather reports. Colleges and universities will offer some job opportunities, especially for those with advanced degrees. The employment of civilian meteorologists by the Federal Government is not expected to grow significantly, although there will be openings created by replacement needs.

Earnings and Working Conditions

Meteorologists have relatively high earnings; their salaries are about twice the average for nonsupervisory workers in private industry, except farming.

In 1977, meteorologists in the Federal Government with a bachelor's degree and no experience received starting salaries of $9,303 or $11,523 a year, depending on their college grades. Those with a master's degree could start at $11,523 or $14,097, and those with the Ph. D. degree at $17,056 or $20,442. The average salary for meteorologists employed by the Federal Government was $24,500 in 1977.

Airline meteorologists' salaries ranged from about $16,000 to $24,000 a year in 1976, depending on experience. (See Statement on Occupations in Civil Aviation elsewhere in the *Handbook*.)

Jobs in weather stations, which are operated around the clock 7 days a week, often involve nightwork and rotating shifts. Most stations are at airports or in or near cities; some are in isolated and remote areas. Meteorologists in smaller weather stations generally work alone; in larger ones, they work as part of a team.

Sources of Additional Information

General information on career opportunities in meteorology is available from:

American Meteorological Society, 45 Beacon St., Boston, Mass. 02108.

American Geophysical Union, 1909 K St. NW., Washington, D.C. 20006.

For facts about job opportunities with the NOAA National Weather

Service and its student cooperative education program, contact:

Personnel Operations Branch, AD 41, National Oceanic and Atmospheric Administration, 6001 Executive Blvd., Rockville, Md. 20852.

MUSICIANS

(D.O.T. 152.028 and .048)

Nature of the Work

The important role that music plays in most people's lives makes it difficult to imagine a world without musicians. Professional musicians are those whose livelihoods depend upon performing for the enjoyment of others. These professionals—whether they play in a symphony orchestra, dance band, rock group, or jazz combo—generally have behind them many years of formal or informal study and practice. As a rule, musicians specialize in either popular or classical music; only a few play both types professionally.

Musicians who specialize in popular music usually play the trumpet, trombone, clarinet, saxophone, organ, or one of the "rhythm" instruments—the piano, string bass, drums, or guitar. Dance bands play in nightclubs, restaurants, and at special parties. The best known bands, jazz groups, rock groups, and solo performers sometimes perform on television.

Classical musicians play in symphonies, opera, ballet and theater orchestras, and for other groups that require orchestral accompaniments. These musicians play string, brass, woodwind or percussion instruments. Some form small groups—usually a string quartet or a trio—to give concerts of chamber music. Many pianists accompany vocal or instrumental soloists, choral groups, or provide background music in restaurants or other places. Most organists play in churches; often they direct the choir.

A few exceptional musicians give their own concerts and appear as soloists with symphony orchestras. Both classical and popular musicians make individual and group recordings.

In addition to performing, many musicians teach instrumental and vocal music in schools and colleges, or give private lessons in their own studios or in pupils' homes. Others combine careers as performers with work as arrangers and composers.

Since a high quality of performance requires constant study and practice, self-discipline is vital.

A few musicians specialize in library science or psychology for work in music libraries or in the field of music therapy in hospitals. Others work as orchestra conductors or band directors.

Places of Employment

About 127,000 persons worked as performing musicians in 1976. Many thousands more taught in elementary and secondary schools and in colleges and universities. (See the statements on teachers elsewhere in the *Handbook*.) Almost every town and city has at least one private music teacher.

Most performing musicians work in cities where entertainment and recording activities are concentrated, such as New York, Chicago, Los Angeles, Nashville, Miami Beach, and New Orleans. Many perform with one of the 31 major symphony groups, the 76 metropolitan orchestras, or the hundreds of community orchestras. Many communities have orchestras and dance bands which offer at least part-time work. The various branches of the Armed Forces also offer career opportunities in a number of different musical organizations.

Training and Other Qualifications

Most people who become professional musicians begin studying an instrument at an early age. To acquire great technical skill, a thorough knowledge of music, and the ability to interpret music, young people need intensive training through private study with an accomplished musician, in a college or university which has a strong music program, or in a conservatory of music. For advanced study in one of these institutions, an audition frequently is necessary. Many teachers in these schools are accomplished artists who will train only promising young musicians.

Almost 500 colleges, universities, and music conservatories offer bachelor's and/or higher degrees in instrumental or vocal music. These programs provide training in musical performance, composition, and theory, and also offer liberal arts courses. In addition, about 750 conservatories and colleges and universities offer a bachelor's degree program in music education to qualify graduates for the State certificate for elementary and secondary school teaching positions. College teaching positions usually require advanced degrees, but exceptions may be made for well-qualified artists.

Musicians who play popular music must have an understanding of and feeling for that style of music, but classical training may expand their employment opportunities. As a rule, they take lessons with private teachers when young, and seize every opportunity to play in amateur or professional performances. Establishing a reputation with other musicians is very important in getting started in a career in popular music. Some young people form small dance bands or rock groups. As they gain experience and become known, they may audition for other local bands, and still later, for the better known bands and orchestras.

Young persons who consider careers in music should have musical talent, versatility, creative ability, and poise and stage presence to face large audiences. Since quality of performance requires constant study and practice, self-discipline is vital. Moreover, musicians who do concert and nightclub engagements must have physical stamina because of frequent traveling and schedules that often include night performances.

Employment Outlook

Employment of musicians is expected to grow about as fast as the average through the mid-1980's, but competition for jobs will be keen. Opportunities for concerts and recitals are not numerous enough to provide adequate employment for all the pianists, violinists, and other instrumentalists qualified as concert artists. Competition usually is keen for positions that offer stable employment, such as jobs with major orchestras, with the Armed Forces, and in teaching positions. Because of the ease with which a musician can enter private music teaching, the number of music teachers has been more than sufficient and probably will continue to be. Although many opportunities are expected for single and short-term engagements, playing popular music in night clubs and theaters, the supply of qualified musicians who seek such jobs is likely to exceed demand. On the other hand, first-class, experienced accompanists and outstanding players of stringed instruments are likely to remain relatively scarce.

Earnings and Working Conditions

The amount received for a performance by either classical or popular musicians depends on their geographic location as well as on their professional reputation. Minimum salaries for musicians in the 31 major symphony orchestras in the United States in 1976 ranged from $200 to $400 a week according to the American Symphony Orchestra League. Minimum wages for musicians in metropolitan symphony orchestras were generally between $20 and $40 per concert. Some musicians earned substantially more than the minimums, however.

The major symphony orchestras have seasons ranging from 45 to 52 weeks. About half of them have 50- to 52-week seasons. Few of the metropolitan or community orchestras have seasons of 50 to 52 weeks, however.

Musicians in large metropolitan areas who played at dances, club dates, variety shows, ballets, musical comedies, concerts, and industrial shows generally earned minimums ranging from $40 to $53 for 3 hours of work. Musicians in these areas who had steady engagement contracts earned between $6 and $8 per hour for a 5-day week. Wages for the same types of engagements tended to be less in smaller cities and towns. Musicians employed in motion picture recording earned a minimum of $93 for a 3-hour session; those employed in television commercials earned a minimum of $48 for a 1-hour session. Musicians employed by manufacturers of phonograph recordings were paid a minimum of $110 for a 3-hour session.

Music teachers in public schools earn salaries comparable to those of other teachers. (See statements on elementary and secondary school teachers elsewhere in the *Handbook*.) Many teachers give private music lessons to supplement their earnings. However, earnings often are uncertain and vary according to the musician's reputation, the number of teachers and students in the locality, and the economic status of the community.

Musicians customarily work at night and on weekends, and they must spend considerable time in practice and in rehearsal. Performing engagements usually require some travel.

Many musicians, primarily those employed by symphony orchestras, work under master wage agreements, which guarantee a season's work up to 52 weeks. Musicians in other areas, however, may face relatively long periods of unemployment between jobs. Thus, their earnings generally are lower than those of many other occupations. Moreover, since they may not work steadily for one employer, some performers cannot qualify for unemployment compensation, and few have either sick leave or vacations with pay. For these reasons, many musicians take other types of jobs to supplement their earnings as musicians.

Most professional musicians belong to the American Federation of Musicians (AFL-CIO). Concert soloists also belong to the American Guild of Musical Artists, Inc. (AFL-CIO).

Sources of Additional Information

For information about wages, hours of work, and working conditions for professional musicians, contact:

American Federation of Musicians (AFL-CIO), 1500 Broadway, New York, N.Y. 10036.

Information about the requirements for certification of organists and choir masters is available from:

American Guild of Organists, 630 Fifth Ave., New York, N.Y. 10020.

A list of accredited schools of music and degree programs offered is available from:

National Association of Schools of Music,
11250 Roger Bacon Dr., Reston, Va.
22090.

Further information about careers in music is available from:

Music Educators National Conference, 1902
Association Dr., Reston, Va. 22091.

A book entitled *Careers in Music* can be obtained for $1 from:

American Music Conference, 150 E. Huron,
Chicago, Ill. 60611.

NEWSPAPER REPORTERS

(D.O.T. 132.268)

Nature of the Work

Newspaper reporters gather information on current events and use it to write stories for publication in daily or weekly newspapers. In covering events, they may interview people, review public records, attend news events, and do research. As a rule, reporters take notes or use tape recorders while collecting facts, and write their stories upon return to the office. Sometimes, to meet deadlines, they telephone their information or stories to rewriters who write or transcribe the stories for them.

Large dailies frequently assign some reporters to "beats," such as police stations or the courts, to gather news originating in these places. General assignment reporters handle various types of local news, such as a story about a lost child or an obituary of a community leader. Specialized reporters with a background in a particular subject interpret and analyze the news in fields such as medicine, politics, science, education, business, labor, and religion.

Reporters on small newspapers may cover not only all aspects of local news, but also may take photographs, write headlines, lay out pages, and write editorials. On some small weeklies, they also may solicit advertisements, sell subscriptions, and perform general office work.

Reporters gathering news information.

Places of Employment

More than 40,000 persons worked as newspaper reporters in 1976. The majority of reporters work for urban daily newspapers; others work for suburban, community, or small town weekly papers and press services.

Reporters work in cities and towns of all sizes. Of the 1,762 daily and 7,579 weekly newspapers, the great majority are in medium-sized towns. However, most reporters work in cities, since big city dailies employ many reporters, whereas a small town paper generally employs only a few.

Training, Other Qualifications, and Advancement

Most newspapers consider only applicants who have a college education. Graduate work is increasingly important. Many editors prefer graduates who have a degree in journalism, which usually includes training in the liberal arts along with professional journalism training. Some editors consider a liberal arts degree sufficient. Others prefer applicants who have a liberal arts bachelor's degree and a master's degree in journalism. High school courses that are useful include English, journalism, social science, and typing.

Bachelor's degree programs in journalism are available in almost 250 colleges. About three-fourths of the courses in a typical undergraduate journalism curriculum are in liberal arts. Journalism courses include reporting, copyreading, editing, feature writing, history of journalism, law, and the relation of the press to society.

More than 500 junior colleges offer journalism programs. Twelve to fifteen hours of credit earned is transferable to most 4-year college programs in journalism. A few junior colleges also offer programs especially designed to prepare the student directly for employment as a general assignment reporter on a weekly or small daily newspaper. The Armed Forces also provide some training in journalism.

A master's degree in journalism was offered by more than 90 schools in 1976; about 20 schools offered the Ph. D. degree. Some graduate programs are intended primarily as preparation for news careers, while others concentrate on preparing journalism teachers, researchers and theorists, and advertising and public relations workers.

Persons who wish to prepare for newspaper work through a liberal arts curriculum should take English courses that include writing, as well as subjects such as sociology, political science, economics, history, psychology, computer science, and speech. Ability to read and speak a foreign language is desirable. Those who look forward to becoming reporters in a specialized field such as science should concentrate on course work in their subject matter areas. Skill in typing is essential because reporters type their own news stories. On small papers, knowledge of news photography also is valuable.

The Newspaper Fund and individual newspapers offer summer internships that provide college students with an opportunity to practice the rudiments of reporting or editing. In addition, more than 2,700 journalism scholarships, fellowships, and assistantships were awarded to college journalism students by universities, newspapers, and professional organizations in 1976.

News reporting involves a great deal of responsibility, since what a reporter writes frequently influences the opinion of the reading public. Reporters should be dedicated to serving the public's need for accurate and impartial news. Although reporters work as part of a team, they have an opportunity for self-expression. Important personal characteristics include a "nose for news," curiosity, persistence, initiative, resourcefulness, an accurate memory, and the physical stamina necessary for an active and often fast-paced life.

Some who compete for full-time reporter jobs find it is helpful to have had experience as a newspaper "stringer"—a part-time reporter who covers the news in a particular area of the community and is paid on the basis of the stories printed. High school and college newspapers, and church or community newsletters, also provide writing and editing experience that may be helpful in getting a job.

Most beginners start on weekly or on small daily newspapers as general assignment reporters or copy editors. A few outstanding journalism graduates are hired by large city papers, but this is the exception rather than the rule. Large dailies generally require several years of reporting experience, which usually is acquired on smaller newspapers.

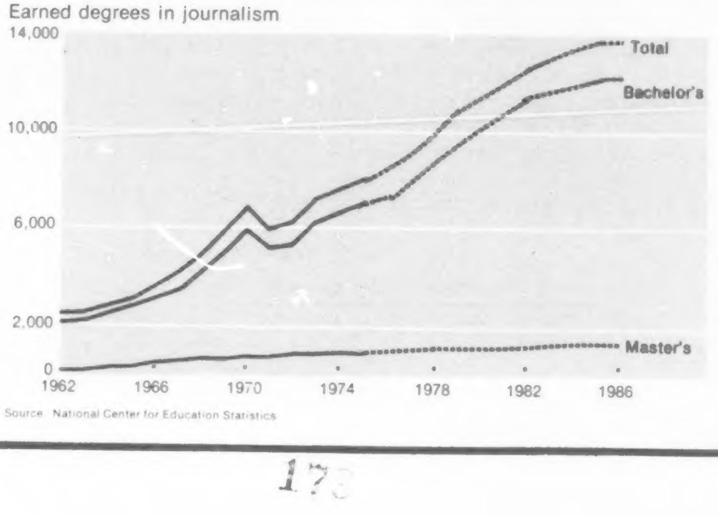
Beginning reporters are assigned duties such as reporting on civic and club meetings, summarizing speeches, writing obituaries, interviewing important visitors to the community, and covering police court proceedings. As they gain experience, they may report more important events, cover an assigned "beat," or specialize in a particular field.

Newspaper reporters may advance to reporting for larger papers or press services. Some experienced reporters become columnists, correspondents, editorial writers, editors, or top executives; these positions represent the top of the field and competition for them is keen. Other reporters transfer to related fields such as public relations, writing for magazines, or preparing copy for radio and television news programs.

Employment Outlook

Competition for newspaper reporting jobs is expected to continue through the mid-1980's. If enrollments continue at record levels as they have in the past few years, record numbers of journalism graduates will be looking for jobs. However, employment in the communications field is not expected to expand sufficiently to absorb all those seeking jobs, and a sizable number of journal-

Rapid increase in the number of jou[illegible]ism graduates will produce intense competition for co[illegible]unications jobs



Source: National Center for Education Statistics ism graduates will have to launch careers in other fields.

Newspaper reporters in particular face heightened job competition. Although the communications field is expected to expand through the mid-1980's, newspapers are not expected to share fully in this growth. As a result, employment of reporters will increase more slowly than the average for all occupations. Most job openings will arise from the need to replace reporters who are promoted to editorial or administrative positions, transfer to other fields of work, retire, or leave the profession for other reasons.

Bright, energetic persons with exceptional writing ability will have the best opportunities for beginning jobs as newspaper reporters. Talented writers who are able to handle news about highly specialized scientific or technical subjects will also be at an advantage in the competitive job market.

Weekly or daily newspapers located in small towns and suburban areas are expected to continue to offer most of the opportunities for beginners entering newspaper reporting. Openings arise on these papers as reporters gain experience and move up to other editorial positions or transfer to reporting jobs on larger newspapers or to other types of work. Beginning reporters able to help with photography and other specialized aspects of newspaper work and who are acquainted with the community are likely to be given preference in employment on small papers.

Most big city dailies require experience and do not ordinarily hire new graduates. Sometimes, however, new graduates find newsroom jobs on major metropolitan dailies because of outstanding credentials in an area for which a particular paper has a pressing need. Occasionally, the experience and contacts gained through an internship program lead to a reporting job directly after graduation.

In addition to newspaper reporting, college graduates who have majored in journalism have the background for jobs in related fields such as advertising, public relations, trade and technical publishing, radio and television, and law. Because continued high enrollment is foreseen in journalism education programs, opportunities to teach journalism are expected to be good. College teaching jobs currently require professional experience and at least a master's degree.

Earnings and Working Conditions

Reporters working for daily newspapers having contracts negotiated by The Newspaper Guild had average starting salaries of $10,600 in late 1976. In general, earnings of newspaper reporters in 1976 were above average earnings received by nonsupervisory workers in private industry, except farming.

Minimum salaries of reporters having 4 or 5 years of experience who worked for daily newspapers with Guild contracts averaged $16,700 in 1976. The minimums ranged from $9,960, paid by the smallest dailies, to more than $26,000 paid by the largest. Many reporters, however, were paid salaries higher than these minimums. Reporters working for national wire services received annual salaries of at least $19,000.

Most newspaper reporters generally work a 5-day, 35- or 40-hour week. Reporters working for morning papers usually start work in the late afternoon and finish at about midnight. Most reporters also receive benefits such as paid vacations, group insurance, and pension plans.

Sources of Additional Information

Information about opportunities for reporters with daily newspapers is available from:

American Newspaper Publishers Association Foundation, P.O. Box 17407, Dulles International Airport, Washington, D.C. 20041.

For information on opportunities in the newspaper field and starting salaries of journalism graduates, as well as a list of journalism scholarships, fellowships, assistantships, and loans available at colleges and universities, write to:

The Newspaper Fund, Inc., Box 300, Princeton, N.J. 08540.

Information on union wage rates is available from:

The Newspaper Guild, Research and Information Department, 1125 15th St. NW., Washington, D.C. 20005.

For general information about careers in journalism contact:

American Council on Education for Journalism, School of Journalism, University of Missouri, Columbia, Mo. 65201.

Association For Education in Journalism, 102 Reavis Hall, Northern Illinois University, Dekalb, Ill. 60115.

The Society of Professional Journalists, Sigma Delta Chi, 35 East Wacker Dr., Chicago, Ill. 60601.

Information on opportunities for women in newspaper reporting and other communications fields is available from:

Women In Communications, Inc., P.O. Box 9561, Austin, Tex. 78766.

Names and locations of daily newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Year Book*, available in most public libraries and large newspaper offices.

OCCUPATIONAL THERAPISTS

(D.O.T. 079.128)

Nature of the Work

Occupational therapists plan and direct educational, vocational, and recreational activities designed to help mentally and physically disabled patients become self-sufficient. They evaluate the capacities and skills of clients, set goals, and plan a therapy program together with the client and members of a medical team which may include physicians, physical therapists, vocational counselors, nurses, social workers, and other specialists.

About two therapists out of five work with emotionally handicapped patients, and the rest work with physically disabled persons. These clients represent all age groups and degrees of disability. Patients participate in occupational therapy to de-

Occupational therapists help handicapped people prepare for employment.

termine the extent of abilities and limitations; to regain physical, mental, or emotional stability; to relearn daily routines such as eating, dressing, writing, and using a telephone; and, eventually, to prepare for employment.

Occupational therapists teach manual and creative skills such as weaving and leather working, and business and industrial skills such as typing and the use of power tools. These skills are taught to restore mobility and coordination and to help the patient regain physical and emotional stability. Therapists also plan and direct games and other activities, especially for children. They may design and make special equipment or splints to help disabled patients.

Besides working with patients, occupational therapists supervise student therapists, occupational therapy assistants, volunteers, and auxiliary nursing workers. The chief occupational therapist in hospitals may teach medical and nursing students the principles of occupational therapy. Many therapists supervise occupational therapy departments, coordinate patient activities, or are consultants to local and State health departments and mental health agencies. Some teach in colleges and universities.

Places of Employment

About 10,600 occupational therapists were employed in 1976. About 4 out of 10 occupational therapists work in hospitals. Rehabilitation centers, nursing homes, schools, outpatient clinics, community mental health centers, and research centers employ most of the others. Some work in special sanitariums or camps for handicapped children, others in State health departments. Still others work in home-care programs for patients unable to attend clinics or workshops. Some are members of the Armed Forces.

Training, Other Qualifications, and Advancement

A degree or certification in occupational therapy is required to enter the profession. In 1976, 49 colleges and universities offered programs in occupational therapy which were accredited by the American Medical Association and the American Occupational Therapy Association. All of these schools offer bachelor's degree programs. Some have 2-year programs and accept students who have completed 2 years of college. Some also offer shorter programs, leading to a certificate or a master's degree in occupational therapy for students who have a bachelor's degree in another field. A graduate degree often is required for teaching, research, or administrative work.

Course work in occupational therapy programs includes physical, biological, and behavioral sciences and the application of occupational therapy theory and skills. These programs also require students to work for 6 to 9 months in hospitals or health agencies to gain experience in clinical practice. Graduates of accredited educational programs are eligible to take the American Occupational Therapy Association certification examination to become a registered occupational therapist (OTR). Occupational therapy assistants who are certified by the association (COTA's) and have 4 years of approved work experience also are eligible to take the examination to become registered occupational therapists. Those COTA's considering this path of entry to the occupation should contact the Director of Certification of the American Occupational Therapy Association to identify the types of experience required to qualify for the examination and to determine the availability of suitable work settings.

Entry to educational programs is keenly competitive and applicants are screened carefully for previous academic performance to select those most likely to complete their studies successfully. Persons considering this profession, therefore, should have above average academic performance and consistent grades of "B" or better in science courses, including biology and chemistry. College students who consider transferring from another academic discipline to an occupational therapy program in their sophomore or junior year need superior grades because competition for entrance to programs is more intense after the freshman year.

Personal qualifications needed in the profession include a sympathetic but objective approach to illness and disability, maturity, patience, imagination, manual skills, and the ability to teach. In addition to biology and chemistry, high school students interested in careers as occupational therapists are advised to take courses in health, crafts, and the social sciences.

Newly graduated occupational therapists generally begin as staff therapists. Advancement is chiefly to supervisory or administrative positions; some therapists pursue advanced education and teach or do research.

Employment Outlook

Employment in this occupation is expected to grow much faster than the average for all occupations due to public interest in the rehabilitation of disabled persons and the success of established occupational therapy programs. Many therapists will be needed to staff hospital rehabilitation departments, community health centers, extended care facilities, psychiatric centers, schools for children with developmental and learning disabilities, and community home health programs.

However, the increasing number of graduates from occupational therapy programs may exceed the number of openings that will occur each year due to growth in the occupation and replacement of those who will die or retire. As a result, new graduates may face competition in some geographic areas through the mid-1980's.

Earnings and Working Conditions

Beginning salaries for new graduates of occupational therapy programs working in hospitals averaged about $12,000 a year in 1976, according to a national survey conducted by the University of Texas Medical School. Some experienced therapists earned as much as $17,000, and some administrators as much as $25,000 to $30,000. In 1976, the average salary of experienced occupational therapists was 1 1/2 times the average earnings for all nonsupervisory workers in private industry, except farming.

In 1977, beginning therapists employed by the Veterans Administration (VA) earned starting salaries of $10,370 a year. The average salary paid occupational therapists working for the VA was about $16,000 at that time.

Many part-time positions are available for occupational therapists. Many therapists work for more than one employer and must travel between job locations.

Sources of Additional Information

For more information on occupational therapy as a career, write to:

American Occupational Therapy Association,
6000 Executive Blvd., Rockville, Md. 20852.

Those COTA's interested in qualifying for the examination to become a registered occupational therapist (OTR) through acquired work experience should contact the Director of Certification at the above address.

OCCUPATIONAL SAFETY AND HEALTH WORKERS

(D.O.T. 010.081; 012.081 and .188; 079.188; 168.168, .268, and .284; 379.387; 821.387; and 909.128)

Nature of the Work

People in the occupational safety and health field have the challenging job of insuring a safe and healthful environment for workers and safe products for consumers. Safety and health workers in a number of different occupations strive to control occupational accidents and diseases, property losses, and injuries from unsafe products. This statement discusses occupations in private industry; for a discussion of related occupations in government, see the statement on health and regulatory inspectors elsewhere in the *Handbook*.

The largest group of safety workers is *safety engineers*. Although all of them are concerned with preventing accidents, their specific tasks depend on where they work. For example, the safety engineer working in a large manufacturing plant (D.O.T. 012.081) may develop a comprehensive safety program covering several thousand employees. This usually entails detailed analysis of each job in the plant to identify potential hazards so that preventive measures can be taken. When accidents do occur, safety engineers in manufacturing plants investigate to determine the cause. If poor design, improper maintenance, or mechanical failure is involved, they use their technical skills to correct the situation and prevent its recurrence. When human error is the cause of an accident, safety engineers may establish training courses for plantworkers and supervisors or reemphasize existing ones.

Safety engineers who work for trucking companies (D.O.T. 909.128) study schedules, routes, loads, and speeds to determine their influence on trucking accidents. They also inspect heavy rigs, such as trucks and trailers, to suggest ways of safer operation. In the mining industry, safety engineers (D.O.T. 010.081) may inspect underground or open-pit areas to insure compliance with State and Federal laws, design protective equipment and safety devices for mine machinery, or lead rescue activities during emergencies.

Many safety engineers are directly concerned with the safety of their company's product. They work closely with design engineers to develop models that meet all safety standards, and they monitor the manufacturing process to insure the safety of the finished product.

Safeguarding life and property against loss from fire, explosion, and related hazards is the job of the *fire protection engineer* (D.O.T. 012.188). Those who specialize in research investigate problems such as fires in high-rise buildings or the manufacture, handling, and storage of flammable materials. Fire protec-

Safety engineers inspecting plant machinery for potential hazards.

tion engineers in the field use these research findings to identify hazards and devise ways to correct them. For example, new findings concerning flashpoints (the temperatures at which different materials will ignite) are valuable to the engineer designing storage facilities in a chemical plant.

Like safety engineers, fire protection engineers may have different job duties depending on where they work. One who works for a fire equipment manufacturing company may design new fire protection devices, while engineers in consulting firms work with architects and others to insure that fire safety is built into new structures. In contrast, fire protection engineers working for insurance rating bureaus (organizations that calculate basic costs of insurance coverage in particular areas) inspect private, commercial, and industrial properties to evaluate the adequacy of fire protection for the entire area. Many fire protection engineers have special expertise in one area or more of fire protection, such as sprinkler or fire detection systems.

Losses in the workplace cannot be reduced without measures to eliminate hazards to workers' health. Designing and maintaining a healthful work environment is the job of the *industrial hygienist* (D.O.T. 079.188). These health professionals are concerned with how noise, dust, vapors, and other hazards common to the industrial setting affect workers' health. After a problem is detected, perhaps by analyzing employee medical records, the industrial hygienist at the jobsite may take air samples, monitor noise levels, or measure radioactivity levels in the areas under investigation.

Other industrial hygienists work in private laboratories or in those maintained by large insurance companies or industrial firms. Laboratory hygienists analyze air samples, do research on the reliability of health equipment such as respirators, or investigate the effects of exposure to chemicals or radiation. Some hygienists specialize in problems of air and water pollution. For example, these health professionals may work with government officials, environmental groups, labor organizations, and plant management to develop a system to screen harmful substances before they enter and pollute a river.

Loss control and *occupational health consultants* (D.O.T. 168.168) in property-liability insurance companies perform many services for their clients. These range from correcting a single hazard in a small business to devising a program to eliminate or reduce all losses arising out of a large firm's operation. When dealing with a new account, the consultant makes a thorough inspection of the plant and then confers with management to formulate a program that meets the company's needs. The consultant may, for example, help set up plant health programs and medical services, assist plant personnel to insure that a new facility meets all safety requirements, or train plant safety people. Safety and health consultants also help their company's underwriters determine whether a risk is acceptable and the amount of premium to charge.

Places of Employment

An estimated 28,000 persons were engaged in occupational safety and health work in 1976. About one-quarter of these carried the professional designations, Certified Safety Professional; Certified Industrial Hygienist; or Member, Society of Fire Protection Engineers. Many others who are not certified performed professional level work, while a relatively small number were employed in the occupational safety and health field as technicians and inspectors. Property and liability insurance companies employ many occupational safety and health workers to provide engineering, consulting, and inspection services to their clients. Others worked for a variety of industrial, manufacturing, and commercial concerns.

These workers are needed wherever large numbers of people are concentrated and industrial development occurs. Insurance consultants generally have their headquarters in a region's major city and travel to and from the sites they visit.

Training, Other Qualifications, and Advancement

Entry level safety and health professionals generally need at least a bachelor's degree in engineering or science. A more specialized degree, such as one in safety management, industrial safety, or fire protection engineering, often is helpful in getting a good job. Many employers prefer applicants with a graduate degree in areas such as industrial hygiene, safety engineering, or occupational safety and health engineering, or those with prior industrial work experience. Some employers will hire graduates of 2-year college curriculums as technicians, particularly if they have work experience related to the job.

Continuing education is necessary to stay abreast of changing technologies, new ideas, and emerging trends. Many insurance companies offer training seminars and correspondence courses for their staffs. The Occupational Safety and Health Administration (OSHA) conducts courses for safety and health workers on topics such as occupational injury investigation and radiological health hazards. The recognized marks of achievement in the field are the designations Certified Safety Professional; Certified Industrial Hygienist; and Member, Society of Fire Protection Engineers. Certification is conferred by the Board of Certified Safety Professionals, the American Board of Industrial Hygiene, or the Society of Fire Protection Engineers after the candidate completes the required experience and passes an examination.

In addition to possessing technical competence, safety and health workers must be able to communicate well and motivate others. They should be able to adapt quickly to different situations, being equally at ease with a representative of a local union, a supervisor in the welding shop, or a corporate executive. Because physical activity is basic to the job, good physical condition is necessary.

In the insurance industry, safety and health workers can be promoted to department manager in a small branch office, move up to larger branch offices, and finally take an executive position in the home office. In industrial firms, they can advance to plant safety and health manager or corporate manager over several plants. Although extensive experience is required, technicians can advance to professional safety and health positions.

Employment Outlook

Employment of safety and health workers is expected to increase faster than the average for all occupations through the mid-1980's as growing concern for occupational safety and health and consumer safety continues to generate programs and jobs. Many openings will arise also to replace workers who die, retire, or leave their jobs for other reasons.

Much of the employment growth is expected to occur in industrial and manufacturing firms. Many firms now without a safety and health program are expected to establish one, and others will upgrade and expand existing programs in response to government requirements, union interest, and rising insurance costs. The number of safety and health workers in casualty insurance companies also will increase as more small employers request the services of their insurer's engineering or loss control department. Prospects should be best for graduates of occupational safety or health curriculums.

Earnings and Working Conditions

Salaries of safety and health workers vary widely according to education, experience, and specialty. In manufacturing firms, persons with a bachelor's degree generally started at between $12,000 and $15,000 a year in 1976, according to the limited data available. Those with a graduate degree usually received higher starting salaries, and technicians somewhat lower ones. Safety and health workers with several years' experience averaged $18,000 to $22,000, and corporate managers well over $25,000 a year.

The amount of travel required depends upon job specialty and geographic location. For example, the plant safety engineer may travel only to seminars and conferences, while the insurance consultant may spend about half the time traveling between worksites. Usually, a car is furnished or workers are reimbursed for the expenses of using their own vehicles.

Sources of Additional Information

For general information about safety careers, write to:

American Society of Safety Engineers, 850 Busse Highway, Park Ridge, Ill. 60068.

Also available from the Society is a booklet that lists colleges and universities offering degree programs in the occupational safety and health field.

Information concerning a career in industrial hygiene is available from:

American Industrial Hygiene Association, 66 S. Miller Rd., Akron, Ohio 44313.

Career information concerning fire protection engineering may be obtained from:

Society of Fire Protection Engineers, 60 Batterymarch St., Boston, Mass. 02110.

Career information on insurance loss control consulting is available from the home offices of many property-liability insurance companies.

The National Institute for Occupational Safety and Health of the U.S. Public Health Service provides general information on requirements for various careers in the occupational safety and health field, as well as lists of college and universities that award degrees in the various occupational safety and health disciplines. This information is available from:

Division of Training and Manpower Development, National Institute for Occupational Safety and Health, Robert A. Taft Laboratories, 4676 Columbia Parkway, Cincinnati, Ohio 45226.

OCEANOGRAPHERS

(D.O.T. 024.081 and 041.081)

Nature of the Work

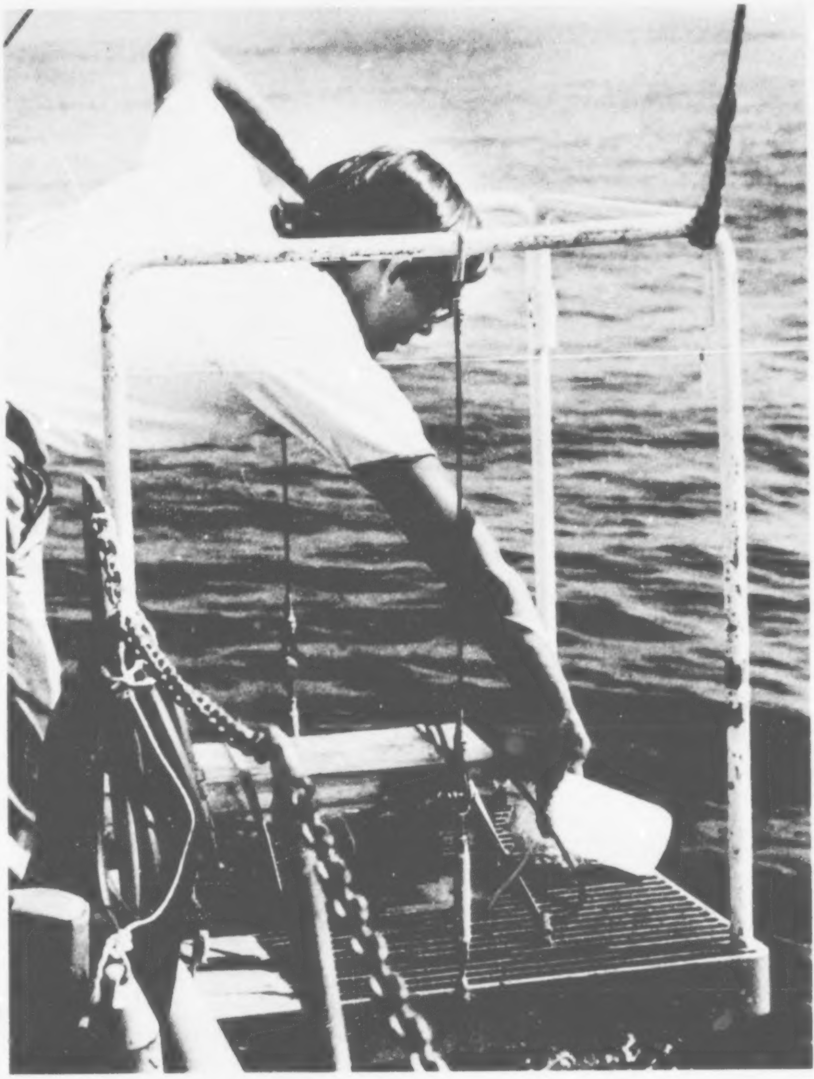
Oceans cover more than two-thirds of the earth's surface and are a source of valuable foods, fossil fuels, and minerals. They also influence the weather, serve as a "highway" for transportation, and offer many kinds of recreation. Oceanographers use the principles and techniques of natural science, mathematics, and engineering to study oceans—their movements, physical properties, and plant and animal life. Their research not only extends basic scientific knowledge, but also helps develop practical methods for forecasting weather, developing fisheries, mining ocean resources, and improving national defense.

Most oceanographers test their ideas about the ocean by making observations and conducting experiments at sea. They may study and collect data on ocean tides, currents, and other phenomena. They may study undersea mountain ranges and valleys, oceanic interactions with the atmosphere, and layers of sediment on and beneath the ocean floor.

Many oceanographers work primarily in laboratories on land where, for example, they measure, dissect, and photograph fish. They also study sea specimens and plankton (floating microscopic plants and animals). Much of their work entails identifying, cataloging, and analyzing different kinds of sea life and minerals. At other laboratories, oceanographers plot maps or use computers to test theories about the ocean. For example, they may study and test the theory of continental drift, which states that the continents were once joined together, have drifted to new positions, and continue to drift, causing the sea floor to spread in places. To present the results of their studies, oceanographers prepare charts, tabulations, and reports, and write papers for scientific journals.

Oceanographers explore and study the ocean with surface ships, aircraft, and various types of underwater craft. They use specialized instruments to measure and record the findings of their explorations and studies. Special cameras equipped with strong lights are used to photograph marine life and the ocean floor. Sounding devices are used to measure, map, and locate ocean materials.

Most oceanographers specialize in one branch of the science. *Biological oceanographers* (marine biologists) study plant and animal life in the ocean. The biological oceanographer's research has practical applications in improving and controlling commercial and sport fishing and in determining the effects of pollution



Four out of 10 oceanographers work in just three States—California, Maryland, and Virginia.

on marine life. *Physical oceanographers* (physicists and geophysicists) study the physical properties of the ocean. Their research on the relationships between the sea and the atmosphere may lead to more accurate prediction of the weather. *Geological oceanographers* (marine geologists) study the ocean's underwater mountain ranges, rocks, and sediments. Locating regions where minerals, oil, and gas might be found under the ocean floor is an application of their work. *Chemical oceanographers* investigate the chemical composition of ocean water and sediments as well as chemical reactions in the sea. *Oceanographic engineers* and *electronic specialists* design and build instruments for oceanographic research and operations. They also lay cables and supervise underwater construction.

Many other scientists also work on problems related to oceans, but are counted in other scientific fields such as biology, chemistry, or geology.

Places of Employment

About 2,700 persons worked as oceanographers in 1976. About one-half worked in colleges and universities, and more than one-fourth for the Federal Government. Federal agencies employing substantial numbers of oceanographers include the Navy and the National Oceanic and Atmospheric Administration (NOAA). Some oceanographers work in private industry; a few work for fishery laboratories of State and local governments.

Most oceanographers work in States that border on the ocean, although there are some oceanographers employed in almost every State. Four out of 10 oceanographers work in just three States—California, Maryland, and Virginia.

Training, Other Qualifications, and Advancement

The minimum requirement for beginning professional jobs in oceanography is a bachelor's degree with a major in oceanography, biology, earth or physical sciences, mathematics, or engineering. However, most jobs in research, teaching, and high-level positions in most other types of oceanographic work require graduate training in oceanography or a basic science, and a doctoral degree is often preferred or required for many oceanography positions.

About 35 colleges and universities offered undergraduate degrees in oceanography or marine sciences in 1976. However, undergraduate training in a basic science and a strong interest in oceanography may be adequate preparation for some beginning jobs and is the preferred background for graduate training in oceanography.

College courses needed to prepare for graduate study in oceanography include mathematics, physics, chemistry, geophysics, geology, meteorology, and biology. In general, students should specialize in the particular science that is closest to their area of oceanographic interest. For example, students interested in chemical oceanography could obtain a degree in chemistry.

In 1976, about 65 colleges offered advanced degrees in oceanography and marine sciences. In graduate schools, students take advanced courses in oceanography and in basic sciences.

Graduate students usually work part of the time aboard ship, where they do oceanographic research and become familiar with the sea and with techniques used to obtain oceanographic information. Universities having oceanographic research facilities along our coasts offer summer courses for both graduate and undergraduate students. Oceanographers should have the curiosity needed to do research and the patience to collect data and conduct experiments.

Beginning oceanographers with the bachelor's degree usually start as research or laboratory assistants, or in jobs involving routine data collection, computation, or analysis. Most beginning oceanographers receive on-the-job training. The extent of the training varies with the background and needs of the individual.

Experienced oceanographers often direct surveys and research programs or advance to administrative or supervisory jobs in research laboratories.

Employment Outlook

Persons seeking jobs in oceanography may face competition through the mid-1980's. Those with a Ph. D. degree should have more favorable employment opportunities than others, while those with less education may find opportunities limited to routine analytical work as research assistants or technicians. Persons who combine knowledge of other scientific or engineering fields with oceanographic studies should have better employment prospects than others whose knowledge is limited to oceanography.

Employment of oceanographers is expected to grow about as fast as the average for all occupations. This growth will result from increased awareness of the need for ocean research for understanding and controlling pollution, for recovering offshore oil and other natural resources, and for national defense. However, growth in employment may not be rapid enough to create enough openings for all those expected to seek entry into this relatively small field. Since the Federal Government finances most oceanographic research, a large increase in Federal spending in oceanography could improve employment prospects.

Earnings and Working Conditions

Oceanographers have relatively high earnings. Their average salaries were more than twice the average received by nonsupervisory workers in private industry, except farming.

In 1977, oceanographers in the Federal Government with a bachelor's degree received starting salaries of $9,303 or $11,523 a year, depending on their college grades. Those with a master's degree could start at $11,523 or $14,097; and those with a Ph. D. degree at $17,056 or $20,442. The average salary for experienced oceanographers in the Federal Government in 1977 was about $23,800 a year.

Oceanographers in educational institutions generally receive the same salaries as other faculty members.

(See statement on College and University Teachers elsewhere in the *Handbook*.) In addition to regular salaries, many earn extra income from consulting, lecturing, and writing.

Oceanographers engaged in research that requires sea voyages are frequently away from home for weeks or months at a time. Sometimes they live and work in cramped quarters. People who like the sea and oceanographic research often find these voyages satisfying and do not consider the time spent at sea a disadvantage of their work.

Sources of Additional Information

For information about careers in oceanography, contact:

Dr. C. Schelske, Secretary, American Society of Limnology and Oceanography, Great Lakes Research Division, University of Michigan, Ann Arbor, Mich. 48109.

Federal Government career information is available from any regional office of the U.S. Civil Service Commission or from:

U.S. Civil Service Commission, Washington Area Office, 1900 E St. NW., Washington, D.C. 20415.

The booklet, *Training and Careers in Marine Science*, is available for fifty cents from:

International Oceanographic Foundation, 3979 Rickenbacker Causeway, Virginia Key, Miami, Fla. 33149.

Some information on oceanographic specialties is available from professional societies listed elsewhere in the *Handbook*. (See statements on Geologists, Geophysicists, Life Scientists, Meteorologists, and Chemists.)

About 1 out of every 2 persons in the United States wears corrective lenses.

OPTOMETRISTS

(D.O.T. 079.108)

Nature of the Work

About one out of every two persons in the United States wears corrective lenses. Optometrists provide most of this care. They examine people's eyes for vision problems, disease, and other abnormal conditions, and test for proper depth and color perception and the ability to focus and coordinate the eyes. When necessary, they prescribe lenses and treatment. Where evidence of disease is present, the optometrist refers the patient to the appropriate medical practitioner. Most optometrists supply the prescribed eyeglasses and fit and adjust contact lenses. Optometrists also prescribe corrective eye exercises or other treatment not requiring drugs or surgery.

Although most optometrists are in general practice, some specialize in work with the aged or with children. Others work only with persons having partial sight who can be helped with microscopic or telescopic lenses. Still others are concerned with the visual safety of industrial workers. A few optometrists teach or do research.

Optometrists should not be confused with either ophthalmologists, sometimes referred to as oculists, or with dispensing opticians. Ophthalmologists are physicians who specialize in medical eye care, eye diseases and injuries, perform eye surgery, and prescribe drugs or other eye treatment, as well as lenses. Dispensing opticians fit and adjust eyeglasses according to prescriptions written by ophthalmologists or optometrists; they do not examine eyes or prescribe treatment. (See statement on dispensing opticians.)

Places of Employment

In 1976, there were about 19,700 practicing optometrists. The majority of optometrists are in solo practice. Others are in partnership or group practice with other optometrists or doctors as part of a professional health care team.

Some optometrists work in specialized hospitals and eye clinics or teach in schools of optometry. Others work for the Veterans Administration, public and private health agencies, and industrial health insurance companies. About 500 optometrists serve as commissioned officers in the Armed Forces. Optometrists also act as consultants to engineers specializing in safety or lighting, consultants to educators in remedial reading, or participants on health advisory committees to Federal, State, and local governments.

About two optometrists out of five practice in towns of under 25,000 inhabitants.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require that optometrists be licensed. Applicants for a license must have a Doctor of Optometry degree from an accredited optometric school and pass a State board examination. In some States, applicants are permitted to substitute the National Board of Optometry examination, given in the third and fourth year of optometric school, for part or all of the written State examination. Several States allow applicants to be licensed without lengthy examination if they have a license in another State.

The Doctor of Optometry degree requires a minimum of 6 years of college consisting of a 4-year professional degree program preceded by at least 2 years of preoptometric study at an accredited university, college, or junior college. In 1976, there were 12 schools and colleges of optometry approved by the Council on Optometric Education of the American Optometric Association. One new school was seeking accreditation. Requirements for admission to these schools usually include courses in English, mathematics, physics, chemistry, and biology, or zoology. Some schools also require courses in psychology, social studies, literature, philosophy, and foreign languages. Admission to optometry schools is competitive. Each year, qualified applicants exceed available places, so serious applicants need superior grades in their preoptometric college courses to enhance their chances for acceptance.

Because most optometrists are self-employed, business ability, self-discipline, and the ability to deal with patients tactfully are necessary for success.

Many beginning optometrists enter into associate practice with an optometrist or other health professional. Others purchase an established practice or set up a new practice. Some take salaried positions to obtain experience and the necessary funds to enter their own practice.

Optometrists wishing to advance in a specialized field may study for a Master's or Doctor of Philosophy degree in physiological optics, neurophysiology, public health administration, health information and communication, or health education. Optometrists who enter the Armed Forces as career officers have the opportunity to work toward advanced degrees and to do vision research.

Employment Outlook

Employment opportunities for optometrists are expected to be favorable through the mid-1980's. The number of new graduates from schools of optometry is expected to be adequate to fill the positions made available by employment growth and the need to replace optometrists who die and retire.

Employment of optometrists is expected to grow about as fast as the average for all occupations. An increase in the total population, especially in the group most likely to need glasses—older people—is a major factor contributing to the expected growth in the occupation. Greater recognition of the importance of good vision and the possibility that more persons will have health insurance to cover optometric services, also should increase the demand for optometric services.

Earnings and Working Conditions

In 1976, net earnings of new optometry graduates averaged about $15,500, but some graduates who started work in the optometry department of chain retail stores earned considerably more. Experienced optometrists averaged about $33,000 annually. Optometrists working for the Federal Government earned an average of $19,300 a year in 1977. Incomes vary greatly, depending upon location, specialization, and other factors. However, after several years, optometrists in associateship or partnership practice may earn substantially more than their solo practitioner counterparts.

Independent practitioners can set their own work schedule. Some work over 40 hours a week, including Saturday. Because the work is not physically strenuous, optometrists often can continue to practice after the normal retirement age.

Sources of Additional Information

Information on optometry as a career and a list of scholarships and loan funds offered by various State associations, societies, and institutions are available from:

American Optometric Association, 7000 Chippewa St., St. Louis, Mo. 63119.

Federal Health Professions Loans are available for optometric students who meet certain financial needs requirements. For information on this financial aid, on the availability of Federal scholarships, and on required preoptometry courses, contact individual optometry schools. The Board of Optometry in the capital of each State can supply a list of optometry schools approved by that State, as well as licensing requirements.

OSTEOPATHIC PHYSICIANS

(D.O.T. 071.108)

Nature of the Work

Osteopathic physicians diagnose and treat diseases or maladies of the human body. They are particularly concerned about problems involving the muscles or bones. One of the basic treatments or therapies used by

Osteopathic physicians are particularly concerned about problems involving the muscles or bones.

osteopathic physicians centers on manipulating these systems with the hands. Osteopathic physicians also use surgery, drugs, and all other accepted methods of medical care.

Most osteopathic physicians are "family doctors" who engage in general practice. These physicians usually see patients in their offices, make house calls, and treat patients in osteopathic and other private and public hospitals. Some doctors of osteopathy teach, do research, or write and edit scientific books and journals.

In recent years, specialization has increased. In 1976, about 25 percent of all osteopathic physicians were practicing in specialties, including internal medicine, neurology and psychiatry, ophthalmology, pediatrics, anesthesiology, physical medicine and rehabilitation, dermatology, obstetrics and gynecology, pathology, proctology, radiology, and surgery.

Places of Employment

About 15,000 osteopathic physicians practiced in the United States in 1976. Almost 85 percent of the active osteopathic physicians were in private practice. A small number had full-time salaried positions in osteopathic hospitals and colleges, private industry, or government agencies.

Osteopathic physicians are located chiefly in those States that have osteopathic hospital facilities. In 1976, three-fifths of all osteopathic physicians were in Florida, Michigan, Pennsylvania, New Jersey, Ohio, Texas, and Missouri. Twenty-one States and the District of Columbia each had fewer than 50 osteopathic physicians. More than half of all general practitioners are located in towns and cities having fewer than 50,000 people; specialists, however, practice mainly in large cities.

Training and Other Qualifications

All 50 States and the District of Columbia require a license to practice osteopathic medicine. To obtain a license, a candidate must be a graduate of an approved school of osteopathic medicine and pass a State board examination In six States, candidates must pass an examination in the basic sciences before they are eligible to take the professional examination; 37 States and the District of Columbia also require a period of internship in an approved hospital after graduation from an osteopathic school. The National Board of Osteopathic Examiners also gives an examination which is accepted by most States as a substitute for State examination. All States except Alaska and Florida grant licenses without further examination to properly qualified osteopathic physicians already licensed by another State.

The minimum educational requirement for entry to one of the schools of osteopathic medicine is 3 years of college work, but in practice almost all osteopathic students have a bachelor's degree. Preosteopathic education must include courses in chemistry, physics, biology, and English. Osteopathic colleges require successful completion of 3 to 4 years of professional study for the degree of Doctor of Osteopathy (D.O.). During the first half of professional training, emphasis is placed on basic sciences, such as anatomy, physiology, and pathology, and on the principles of osteopathy; the remainder of the time is devoted largely to clinical experience with patients in hospitals and clinics.

After graduation, nearly all doctors of osteopathic medicine serve a 12-month internship at 1 of the 79 osteopathic hospitals approved by the American Osteopathic Association for intern and/or residency training. Those who wish to become specialists must have 2 to 5 years of additional training.

The osteopathic physician's training is very costly because of the length of time it takes to earn the D.O. degree. However, Federal and private funds are available for loans for students, and scholarships are available to those who qualify and agree to a minimum of 2 years' Federal service.

In 1977, there were 12 schools of osteopathic medicine. Schools admit students on the basis of grades received in college, scores on the required New Medical College Admissions Test, and recommendations from premedical college counselors. The applicant's desire to serve as an osteopathic physician rather than as a doctor trained in other fields of medicine is a very important qualification. The colleges also give considerable weight to a favorable recommendation by an osteopathic physician familiar with the applicant's background.

Newly qualified doctors of osteopathic medicine usually establish their own practice, although a growing number are entering group practice. Some work as assistants to experienced physicians or become associated with osteopathic and allopathic (M.D.) hospitals. In view of the variation in State laws, persons who wish to become osteopathic physicians should study carefully the professional and legal requirements of the State in which they plan to practice. The availability of osteopathic hospitals and clinical facilities also should be considered.

Persons who wish to become osteopathic physicians must have a strong desire to pursue this career above all others. They must be willing to study a great deal throughout their career to keep up with the latest advances in osteopathic medicine. They should exhibit leadership, emotional stabiliy, and self-confidence. A pleasant personality, friendliness, patience, and the ability to deal with people also are important.

Employment Outlook

Opportunities for osteopathic physicians are expected to be very good through 1985. Many localities are without medical practitioners of any kind; many more have few or no osteopathic physicians. In addition, many new osteopaths will be needed to replace those who retire or die. The greatest demand probably will continue to be in States where osteopathic medicine is a widely known and accepted method of treatment, such as Pennsylvania, Florida, and a number of Midwestern States. Generally, prospects for beginning a successful practice are likely to be best in rural areas, small towns, and city suburbs, where young doctors of osteopathy may establish their professional reputations more easily than in the centers of large cities.

The osteopathic profession is expected to grow faster than the average for all occupations through the mid-1980's because of population growth, the establishment of additional osteopathic hospital facilities, and the extension of prepayment programs for hospitalization and medical care including Medicare and Medicaid.

Earnings and Working Conditions

In osteopathic medicine, as in many of the other health professions, incomes usually rise markedly after the first few years of practice. Earnings of individual practitioners are determined mainly by ability, experience, geographic location, and the income level of the community served. In 1974, the average income of general practitioners after business expenses was about $31,000, according to the limited data available. This income is very high in comparison with other professions. Specialists usually had higher incomes than general practitioners.

Many osteopathic physicians work more than 50 or 60 hours a week. Those in general practice work longer and more irregular hours than specialists.

Sources of Additional Information

People who wish to practice in a given State should find out about the requirements for licensure directly from the board of examiners of that State. Information on Federal scholarships and loans is available from the Director of Student Financial Aid at the individual schools of osteopathy. For a list of State boards, as well as general information on osteopathy as a career, contact:

American Osteopathic Association, Department of Public Relations, 212 East Ohio St., Chicago, Ill. 60611.

American Association of Colleges of Osteopathic Medicine, 4720 Montgomery Lane, Washington, D.C. 20014.

PARK, RECREATION, AND LEISURE SERVICE WORKERS

(D.O.T. 079.128, 159.228, 187.118, 195.168, 195.228)

Nature of the Work

Participation in organized recreation is more important today than ever before as many Americans find the amount of leisure time in their lives increasing. Park, recreation, and leisure service workers plan, organize, and direct individual and group activities that help people enjoy their leisure hours. They work with people of various ages and socioeconomic groups; the easy-to-reach, and those who have tuned out society; the sick and the well; the emotionally and physically handicapped. Employment settings range from the wilderness to rural to suburban and urban, including the inner city. Jobs can be found in municipal, county, special district, State and Federal tax-supported agencies; voluntary youth service organizations; commercial enterprises; and colleges and universities.

The park, recreation, and leisure service field provides career opportunities in two major areas which, despite some overlap, involve distinctive characteristics and training requirements. Activity with and for people is the chief characteristic of *Recreation Program Services*. Examples of recreation program jobs include playground leaders; program specialists in dance, drama, karate, tennis, the arts, and other physical activity; recreation center directors; therapeutic recreation specialists; camp counselors and wilderness leaders; senior citizen program leaders; civilian special services directors in the Armed Forces; and industrial recreation directors. Participants engage in recreational activity as a means of achieving personal satisfaction and other goals. Skilled leadership is required. The other major career area is *Park Management and Natural Resources*, which focuses on activities in natural and constructed areas, facilities, and environments. Job examples include outdoor recreation planners and park managers. These personnel work closely with others including grounds and facilities maintenance personnel; park rangers; landscape architects; foresters; and soil, range and wildlife conservationists. An understanding of the natural environment, physical planning, and maintenance and operation are essential job requirements. (Separate statements on foresters, range managers, landscape architects, soil conservationists, life scientists, and other closely related occupations are found elsewhere in the *Handbook*).

Park, recreation, and leisure service workers in full-time, year-round jobs occupy a variety of positions at different levels of responsibility. *Recreation program leaders* and *park technicians and aides* provide face-to-face leadership, give instruction in crafts, games, and sports, keep records, maintain recreation facilities, assist park rangers, and staff visitor centers.

Specialists include those trained in dance, drama, and the arts, in landscape architecture, horticulture, forestry, biology, and a variety of other fields. These specialists are employed by many park and recreation agencies and often are involved in program development, planning, implementation, and management.

Supervisors plan programs; supervise recreation leaders or park personnel; manage recreation facilities; provide direction in areas of specialization such as arts and crafts, music, drama, dance, and sports; or supervise leadership personnel over an entire region.

Administrators include directors of parks and recreation, superintendents of parks and/or recreation, and various division heads. These individuals have overall responsibility for administration, budget, personnel, programming and/or park management.

Educators teach park and recreation courses, supervise field work students, do research, and provide public service expertise.

Places of Employment

About 85,000 persons were primarily employed year round as park, recreation, and leisure service workers in 1976. The majority worked in public, tax-supported agencies including 2,018 municipal park and recreation departments, 1,211 county park and recreation agencies, 345 special districts, and the State park systems. In addition to these public agencies, a number of other employment settings provide year-round jobs for park, recreation, and leisure service workers.

Several thousand persons work for the Federal Government as recreation specialists (sports, art, music, theatre, therapeutic), outdoor recreation planners, park managers and technicians, and recreation assistants and aides. They work primarily for the Forest Service and Soil Conservation Service of the Department of Agriculture; the Corps of Engineers and Armed Forces Recreation of the Department of Defense; the Veterans Administration; and the National

A majority of all paid employees in the park, recreation, and leisure service field are part time or seasonal workers.

Park Service, Bureau of Land Management, Bureau of Outdoor Recreation, and U.S. Fish and Wildlife Service of the Department of Interior.

Peace Corps and Vista employ park and recreation personnel in 68 foreign countries and in the United States to plan and supervise recreational activities for deprived persons.

Boys' and Girls' Clubs provide a variety of recreational, guidance, and instructional activities to help youngsters grow and work together, to discover their needs, understand themselves, and achieve a sense of responsibility.

Senior centers and retirement communities offer older people a range of recreation and leisure activities, and often employ trained staff to supervise and coordinate the assistance provided by volunteers.

Therapeutic recreation is a rapidly growing specialized field which provides services to help an individual recover or adjust to illness, disability, or a specific social problem. Places where recreational therapists work include hospitals, correctional institutions, health and rehabilitation centers, nursing homes, and private schools and camps for the mentally retarded, emotionally disturbed, and physically handicapped. Therapeutic recreation workers, in conjunction with physicians, prescribe activities on a one-to-one basis.

Many jobs for park, recreation, and leisure service workers are found in private and commercial recreation—including amusement parks, sports and entertainment centers, wilderness and survival enterprises, tourist attractions, vacation excursions, resorts and camps, health spas, clubs, apartment complexes, and other settings.

The park, recreation, and leisure service field is characterized by an unusually large number of part-time, seasonal, and volunteer jobs. Volunteers represent perhaps three out of every four individuals performing service in public park and recreation agencies. Some serve on local park and recreation boards and commissions. The vast majority serve as volunteer activity leaders at local playgrounds, or in youth organizations, nursing homes, hospitals, senior centers, and other settings. Many park and recreation professionals have found that volunteer experience, as well as part-time work during school, can lead directly to a full-time job. A majority of all paid employees in the park, recreation, and leisure service field are part-time or seasonal workers. Typical jobs include summer camp counselors and playground leaders, lifeguards, craft specialists, after school and weekend recreation program leaders, park rangers, maintenance personnel, and others. Many of these jobs are filled by teachers and college students.

Training, Other Qualifications, and Advancement

A college degree with a major in parks and recreation is increasingly important for those seeking full-time career positions in the park, recreation, and leisure service field. Generally, an applicant's level of formal education and training determine the type of job he or she can get.

A number of aide, recreation program leader, and park technician positions currently are filled by high school graduates. However, those seeking career potential should obtain a minimum of an associate degree. Some jobs at the recreation leader level require specialized training in a particular field, such as art, music, drama, or athletics.

Positions as specialists normally require a minimum of a baccalaureate degree. However, the degree usually is in the area of specialization, such as forestry or biology, rather than in parks and recreation.

Most supervisors have a baccalaureate degree plus experience. A degree in parks and recreation may improve chances for career advancement.

A baccalaureate degree and experience are considered minimum requirements for administrators. However, increasing numbers are obtaining master's degrees in parks and recreation as well as in related disciplines. Many persons with backgrounds in other disciplines including social work, forestry, and resource management pursue graduate degrees in recreation.

In 1975, over 1,200 educators taught parks and recreation in junior and community colleges and senior colleges and universities. On the junior college level, 90 percent of the faculty had a master's degree or less while on the senior college level, one-half had a master's degree and the other half had a doctorate.

In 1975, about 165 2-year community colleges offered associate degree recreation leadership and park technician programs; 180 4-year colleges and universities offered park and recreation curriculums. In addition, over 80 master's degree programs and about 25 doctoral programs were offered. Programs in therapeutic recreation were offered by about 45 community and junior colleges and 95 4-year colleges and universities. A number of graduate programs were taught.

The National Recreation and Park Association (NRPA) is beginning a process of accrediting park and recreation curriculums. Students in accredited baccalaureate degree programs will devote about one-half of their time to general education courses in which they may gain knowledge of the natural and social sciences including an understanding of human growth and development and of people as individuals and as social beings; history and appreciation of human cultural, social, intellectual, spiritual, and artistic achievements; and other areas of interest. Another one-fourth of their time will involve exposure to professional park and recreation education including history, theory, and philosophy; community organization; recreation and park services; leadership supervision and administration; understanding of special populations such as the elderly or handicapped; and field work experience. Students may spend the remainder of their time developing competencies in specialized professional areas such as therapeutic recreation (courses in psychology, health, education, and sociology are recommended), park management, outdoor recreation, park and recreation administration, industrial or commercial recreation (courses in business administration are recommended), camp management, and other areas.

Persons planning park, recreation, and leisure service careers must be good at motivating people and sensitive to their needs. Good health and physical stamina are required. Activity planning calls for creativity and resourcefulness. Willingness to accept responsibility and the ability to exercise judgment are important qualities since park and recreation personnel often work alone. To increase their leadership skills and understanding of people, students are advised to obtain related work experience in high school and college. Opportunities for part-time, summer, or after-school employment, or for volunteer work, may be available in local park and recreation departments, youth service agencies, religious or welfare agencies, nursing homes, camps, parks, or nature centers. Such experience may help students decide whether their interests really point to a human service career. Students also should talk to local park and recreation professionals, school guidance counselors, and others.

After a few years of experience, aides or recreation program leaders may become supervisors. However, additional education may be desired. Although promotion to administrative positions may be easier for persons with graduate training, advancement usually is possible through a combination of education and experience.

An effort currently is underway to establish professional status and recognition for the field of parks and recreation (accreditation of curriculums is discussed earlier in the statement). There currently is no licensing requirement for individuals employed in public park and recreation agencies. However, NRPA has developed national standards for professional and technical personnel, including both education and experience requirements. NRPA expects many States to adopt these standards in the coming years. Some therapeutic recreation workers are subject to mandatory requirements that denote competence to practice their profession. Those working in long-term care facilities must be registered by the NRPA, National Therapeutic Recreation Society's Board of Registration, or by the State in which they work.

Employment Outlook

The need for trained park, recreation, and leisure service workers is expected to grow as physical fitness and recreation become increasingly important to millions of Americans; as the number of older people using senior centers and nursing homes increases; as the demand for camp sites, lakes, streams, trails, and picnic areas increases; as correctional institutions recognize the need for such personnel; as the need develops for creative expression in the arts and humanities; and as the citizen's understanding of the use of our leisure and natural resources increases. However, because of financial uncertainty in both the public and private sectors, this need for trained personnel may not necessarily result in actual employment growth. Many openings, nevertheless, will arise annually from deaths, retirements, and other separations from the labor force.

A 1976 National Recreation and Park Association study indicates that competition is keen for many jobs in municipal, county, special district, and State park systems. Contributing to the competitive job situation are recent sizable increases in the number of park and recreation graduates and the austerity budgets adopted by many local governments and municipalities since the early 1970's.

The long-term employment outlook is difficult to assess, largely because of uncertainty about future funding levels for these and other public services. Furthermore, persons with a wide variety of experience and education may seek to become park, recreation, and leisure service workers. However, persons with formal training and experience in parks and recreation are expected to have the best job opportunities in this field; those with graduate degrees should have the best opportunities for supervisory and administrative positions. If the number of park and recreation curriculums continues to grow, master's and Ph. D. degree holders may find favorable teaching opportunities.

Additional job opportunities are expected in therapeutic recreation, private and commercial recreation, and—to a lesser extent—in senior centers and youth organizations. Opportunities for specially trained therapeutic recreation workers are likely to be favorable, in line with the anticipated need for additional staff in many health-related occupations. By contrast, competition for jobs as camp directors is expected to be very keen.

Job experience prior to graduation will greatly help a graduate find a position. Although competition is expected to be keen, many opportunities for part-time and summer employment will be available for recreation program leaders and aides in local government recreation programs. Many of the summer jobs will be for counselors and craft and athletic specialists in camps.

Earnings and Working Conditions

Starting salaries in State and local governments for recreation program leaders with a bachelor's degree averaged about $9,300 in 1976, according to a survey by the International Personnel Management Association. There was a wide salary range among employers—in general, salaries were highest in the West and lowest in the South. Average earnings for park and recreation workers are higher than those for nonsupervisory workers in private industry, except farming.

According to NRPA, 2-year associate degree graduates received starting salaries ranging from $6,500 to $9,500 in 1976. Individuals with baccalaureate degrees obtained park and recreation positions with annual salaries that were in the $7,200 to $12,000 range. Persons with graduate degrees generally received higher salaries. All salaries varied widely depending on the size and type of employing agency and geographic area.

Supervisors' salaries ranged from $10,000 to $20,000. Salaries for specialists varied greatly, but generally were equivalent to those of supervisory personnel. The average salary for chief administrators in public park and recreation agencies was about $20,000, and ranged up to $45,000.

The average annual starting salary for recreational therapists (positions requiring a college degree in recreational therapy or a related field) in hospitals and medical centers was about $10,200 in 1976, according to a survey conducted by the University of Texas Medical School. Top salaries for experienced recreational therapists in these settings averaged $12,200, and some were as high as $17,800.

Starting salaries for recreation and park professionals in the Federal Government in 1977 were $9,303 for applicants with a bachelor's degree; $11,523 for those with a bachelor's degrees plus 1 year of experience; $14,097 for those with a bachelor's plus 2 years' experience or a master's degree; and $17,056 for those with a bachelor's plus 3 years' experience or a Ph. D. Recreation and park assistants, aides, and technicians earn considerably less than these professionals.

The average week for recreation and park personnel is 35-40 hours. Many camp recreation workers live at the camps where they work, and their room and board are included in their salaries. Most public and private recreation agencies provide vacation and other fringe benefits such as sick leave and hospital insurance.

People entering the park, recreation, and leisure service field should expect some night work and irregular hours. In addition, workers often spend much of their time outdoors when the weather permits.

Sources of Additional Information

Information about parks, recreation, and leisure services as a career, employment opportunities in the field, colleges and universities offering park and recreation curricula, accreditation, and registration and certification standards is available from:

National Recreation and Park Association, Division of Professional Services, 1601 North Kent St., Arlington, Va. 22209.

For information on careers in industrial recreation, contact:

National Industrial Recreation Association, 20 North Wacker Dr., Chicago, Ill. 60606.

For information on careers in camping and job referrals, send postpaid return envelope to:

American Camping Association, Bradford Woods, Martinsville, Ind. 46151.

PERSONNEL AND LABOR RELATIONS WORKERS

(D.O.T. 166.088 through .268; 169.118)

Nature of the Work

Attracting the best employees available and matching them to the jobs they can do best is important for the success of any organization. Today, most businesses are much too large for close contact between owners and their employees. Instead, personnel and labor relations workers provide the link between management and employees—assisting management to make effective use of employees' skills, and helping employees to find satisfaction in their jobs and working conditions. Although some jobs in this field require only limited contact with people outside the office, most involve frequent contact with other people. Dealing with people is an essential part of the job.

Personnel workers and labor relations workers concentrate on different aspects of employer-employee relations. Personnel workers interview, select, and recommend applicants to fill job openings. They handle wage and salary administration, training and career development, and employee benefits. "Labor relations" usually means union-management relations, and people who specialize in this field work for the most part in unionized business firms and government agencies. They help officials prepare for collective bargaining sessions, participate in contract negotiations with the union, and handle labor relations matters that come up every day.

In a small company, personnel work consists mostly of interviewing and hiring, and one person usually can handle it all. By contrast, a large organization needs an entire staff, which might include recruiters, interviewers, counselors, job analysts, wage and salary analysts, education and training specialists, and labor relations specialists, as well as technical and clerical workers.

Personnel work often begins with the *personnel recruiter* or *employment interviewer* (D.O.T. 166.268), who works on a person-to-person basis with present and prospective employees. Recruiters travel around the country, often to college campuses, in the search for promising job applicants. Interviewers talk to applicants, and select and recommend those who appear qualified to fill vacancies. They often administer tests to applicants and interpret the results. Hiring and placement specialists need to be thoroughly familiar with the organization and its personnel policies, for they must be prepared to discuss wages, working conditions, and promotional opportunities with prospective and newly hired employees. They also need to keep informed about equal employment opportunity and affirmative action guidelines. Equal employment opportunity is a complex and sensitive area of personnel work which in some large organizations is handled by special EEO counselors or coordinators. The work of employment counselors, which is similar in a number of ways, is described in a separate statement elsewhere in the *Handbook*.

Job analysts (D.O.T. 166.068) and *salary and wage administrators* (D.O.T. 169.118) do very exacting work. Job analysts collect and analyze detailed information on jobs, job qualifications, and worker characteristics in order to prepare job descriptions, sometimes called position classifications, that tell exactly what the duties of a job are and what training and skills it requires. Whenever a government agency or large business firm introduces a new job or evaluates existing ones, it calls upon the expert knowledge of the job analyst. Accurate information about job duties also is required when a firm evaluates its pay system and considers changes in wages and salaries. Establishing and maintaining pay systems is the principal job of wage administrators. They devise ways of making sure that pay rates within the firm are fair and equitable, and conduct surveys to see how their pay rates compare with those elsewhere. Being sure that the firm's pay system complies with laws and regulations is another part of the job, one that requires knowledge of compensation structures and labor law.

Training specialists supervise or conduct training sessions, prepare manuals and other materials for these courses, and look into new methods of training. They also counsel employees on training opportunities, which may include on-the-job, apprentice, supervisory, or management training.

Employee-benefits supervisors and other personnel specialists handle the employer's benefits program, which often includes health insurance, life insurance, disability insurance, and pension plans. These workers also coordinate a wide range of employee services, including cafeterias and snack bars, health rooms, recreational facilities, newsletters and communications, and counseling for work-related personal problems. Counseling employees who are approaching retirement age is a particularly important part of the job of these workers.

Occupational safety and health programs are handled in various ways. Quite often, in small companies especially, accident prevention and industrial safety are the responsibility of the personnel department—or of the labor relations specialist, if the union has a safety representative. Increasingly, however, there is a separate safety department under the direction of a safety and health professional, generally a safety engineer or industrial hygienist. (The work of occupational safety and health workers is discussed elsewhere in the *Handbook*.)

Labor relations specialists (D.O.T. 169.118) advise management on all aspects of union-management relations. When the contract is up for negotiation, they provide background information and technical support, a job that requires extensive knowledge of economics, labor law, and collective bargaining trends. Actual negotiation of the agreement is conducted at the top level, with the director of labor relations or other top-ranking official serving as the employer's representative, but members of the company's labor relations staff play an important role throughout the negotiations.

Much of the everyday work of the labor relations staff concerns interpretation and administration of the contract, the grievance procedures in particular. Members of the labor relations staff might work with the union on seniority rights under the layoff procedure set forth in the contract, for example. Later in the day, they might meet with the union steward about a worker's grievance. Doing the job well means staying abreast of current developments in labor law, including arbitration decisions, and maintaining continuing liaison with union officials.

Personnel workers in government agencies generally do the same kind of work as those in large business firms. There are some differences, however. Public personnel workers deal with employees whose jobs are governed by civil service regulations. Civil service jobs are strictly classified as to duties, training, and pay. This requires a great deal of emphasis on job analysis and wage and salary classification; many people in public personnel work spend their time classifying and evaluating jobs, or devising, administering, and scoring competitive examinations given to job applicants.

Knowledge of rules and regulations pertaining to affirmative action and equal opportunity programs is important in public personnel work. In 1972, the U.S. Civil Service Commission established a specialization for Federal personnel workers concerned with promoting equal opportunity in hiring, training, and advancement. Similar attention to equal employment opportunity, accompanied by a need for qualified staff, is evident in State and local government agencies.

Labor relations is an increasingly important specialty in public personnel administration. Labor relations in this field have changed considerably in recent years, as union strength among government workers has grown. This has created a need for more and better trained workers to handle negotiations, grievances, and arbitration cases on behalf of Federal, State, and local government agencies.

Places of Employment

In 1976, about 335,000 people were personnel and labor relations workers. Nearly 3 out of 4 worked in private industry, for manufacturers, banks, insurance companies, airlines, department stores, and other business concerns. Some worked for private employment agencies, including executive job-search agencies, "office temporaries" agencies, and others.

A large number of personnel and labor relations workers, over 90,000 in 1976, worked for Federal, State, and local government agencies. Most of these were in personnel administration; they handled recruitment, interviewing, testing, job classification, training, and other personnel matters for the Nation's 15 million public employees. Some were on the staff of the U.S. Employment Service and State employment agencies. Still others worked for agencies that oversee compliance with labor laws. Some, for example, were wage-hour compliance officers; their work is described in another part of the *Handbook*, in the statement on health and regulatory inspectors (Government). Other public employees in this field carried out research in economics, labor law, personnel practices, and related subjects, and sought new ways of ensuring that workers' rights under the law are understood and protected.

In comparison with private industry, labor unions do not employ a large number of professionally trained labor relations workers. An elected union official generally handles labor relations matters at the company level. At national and international union headquarters, however, the research and education staff usually includes specialists with a degree in industrial and labor relations, economics, or law.

A few personnel and labor relations workers are in business for themselves as management consultants or labor-management relations experts. In addition, some people in the field teach college or university courses in personnel administration, industrial relations, and related subjects.

Most jobs for personnel and labor relations workers are located in the highly industrialized sections of the country.

Training, Other Qualifications, and Advancement

Many employers seek to fill beginning positions in personnel and labor relations with college graduates. Some employers look for graduates who have majored in personnel administration or industrial and labor relations, while others prefer college graduates with a general business background. Still other employers feel that a well-rounded liberal arts education is the best preparation for personnel work. A college major in personnel administration, political science, or public administration can be an asset in looking for a job with a government agency.

At least 200 colleges and universities have programs leading to a degree in the field of personnel and labor relations. (While personnel administration is widely taught, the number of programs that focus primarily on labor relations is quite small.) In addition, many schools offer course work in closely related fields. An interdisciplinary background is appropriate for work in this area, and a combination of courses in the social sciences, behavioral sciences, business, and economics is useful.

Prospective personnel workers might include courses in personnel management, business administration, public administration, psychology, sociology, political science, economics, and statistics. Courses in labor law, collective bargaining, labor economics, labor history, and industrial psychology provide valuable backgound for the prospective labor relations worker.

Graduate study in industrial or labor relations is often required for work in labor relations. While a law degree seldom is required for jobs at the entry level, most of the people with responsibility for contract negotiations are lawyers, and a combination of industrial relations courses and a law degree is becoming highly desirable.

A college education is important, but it is not the only way to enter personnel work. Some people enter the field at the clerical level, and advance to professional positions on the basis of experience. They often find it helpful to take college courses part time, however.

New personnel workers usually enter formal or on-the-job training programs to learn how to classify jobs, interview applicants, or administer employee benefits. After the training period, new workers are assigned to specific areas in the company's employee relations department. After gaining experience, they usually can advance within their own company or transfer to another employer. At this point, some people move from personnel to labor relations work.

A growing number of people enter the labor relations field directly, as trainees. They usually are graduates of master's degree programs in industrial relations, or may have a law degree. Quite a few people, however, begin in personnel work, gain experience in that area, and subsequently move into a labor relations job.

Workers in the middle ranks of a large organization often transfer to a top job in a smaller one. Employees with exceptional ability may be promoted to executive positions, such as director of personnel or director of labor relations.

Personnel and labor relations workers should speak and write effectively and be able to work with people of all levels of education and experience. They also must be able to see both the employee's and the employer's points of view. In addition, they should be able to work as part of a team. They need supervisory abilities and must be able to accept responsibility. Integrity and fairmindedness are important qualities for people in personnel and labor relations work. A persuasive, congenial personality can be a great asset.

Employment Outlook

The number of personnel and labor relations workers is expected to grow faster than the average for all occupations through 1985, as employers, increasingly aware of the benefits to be derived from good labor-management relations, continue to support sound, capably staffed employee relations programs. In addition to new jobs created by growth of the occupation, many openings will become available each year because of the need to replace workers who die, retire, or leave their jobs for other reasons.

Legislation setting standards for employment practices in the areas of occupational safety and health, equal employment opportunity, and pensions has stimulated demand for personnel and labor relations workers. Continued growth is foreseen, as employers throughout the country review existing programs in each of these areas and, in many cases, establish entirely new ones. This has created job opportunities for people with appropriate expertise. The effort to end discriminatory employment practices, for example, has led to scrutiny of the testing, selection, placement, and promotion procedures in many companies and government agencies. The findings are causing a number of employers to modify these procedures, and to take steps to raise the level of professionalism in their personnel departments.

Substantial employment growth is foreseen in the area of public personnel administration. Opportunities probably will be best in State and local government, areas that are expected to experience strong employment growth over the next decade. By contrast, Federal employment will grow slowly. Moreover, as union strength among public employees continues to grow, State and local agencies will need many more workers qualified to deal with labor relations. Enactment of collective bargaining legislation for State and local government employees could greatly stimulate demand for labor relations workers knowledgeable about public sector negotiations.

Although the number of jobs in both personnel and labor relations is projected to increase over the next decade, competition for these jobs also is increasing. Particularly keen competition is anticipated for jobs in labor relations. A small field, labor relations traditionally has been difficult to break into, and opportunities are best for applicants with a master's degree or a strong undergraduate major in industrial relations, economics, or business. A law degree is an asset.

Earnings and Working Conditions

Beginning job analysts in private industry started at $11,200 a year in 1976, according to a Bureau of Labor Statistics survey. Experienced job analysts earned $19,200 a year, about twice the average for all nonsupervisory workers in private industry, except farming. Wage and salary administrators earned about $19,800 and personnel managers averaged $21,100, according to a survey conducted by the Administrative Management Society. Top personnel and labor relations executives in large corporations earned considerably more.

Average salaries for personnel specialists employed by State governments ranged from $9,900 to $13,000 a year in 1976, according to a survey conducted by the U.S. Civil Service Commission. Personnel specialists who had supervisory responsibilities averaged from $14,800 to $19,500 and State directors of personnel earned average salaries ranging from $27,400 to $31,900 a year.

In the Federal Government, new graduates with a bachelor's degree generally started at $9,300 a year in 1977. Those with a master's degree started at about $14,100 a year. Average salaries of Federal employees in several different areas of personnel work ranged from about $19,300 to $24,500 in 1977, as follows:

Staffing specialists	$19,300
Position classifiers	21,100
Personnel management specialists	21,800
Employee development specialists	21,800
Salary and wage administrators	21,800
Occupational analysts	24,500
Mediators	30,800

Federal employees in the field of labor relations had generally comparable salaries. Labor-management and employee relations specialists and labor-management relations officers averaged $21,800 a year in 1977. Federal mediators' salaries were higher, about $30,800 a year, on the average.

Employees in personnel offices generally work 35 to 40 hours a week. As a rule, they are paid for holidays and vacations, and share in retirement plans, life and health insurance plans, and other benefits available to all professional workers in their organizations.

Sources of Additional Information

For general information on careers in personnel and labor relations work, write to:

American Society for Personnel Administration, 19 Church St., Berea, Ohio 44017.

For information concerning a career in employee training and development, contact:

American Society for Training and Development, P.O. Box 5307, Madison, Wis. 53705.

Information about careers in public personnel administration is available from:

International Personnel Management Association, 1313 E. 60th St., Chicago, Ill. 60637.

A brochure describing a career in labor-management relations as a field examiner is available from:

Director of Personnel, National Labor Relations Board, 1717 Pennsylvania Ave. NW., Washington, D.C., 20570.

PHARMACISTS

(D.O.T. 074.181)

Nature of the Work

Pharmacists dispense drugs and medicines prescribed by medical and dental practitioners and supply and advise people on the use of many medicines that can be obtained with and without prescriptions. Pharmacists must understand the use, composition, and effect of drugs and often test them for purity and strength. They may maintain patient medication profiles and advise physicians on the proper selection and use of medicines. Compounding—the actual mixing of ingredients to form powders, tablets, capsules, ointments, and solutions—is now only a small part of pharmacists' practice, since most medicines are produced by manufacturers in the form used by the patient.

Many pharmacists employed in community pharmacies also have other duties. Besides dispensing medicines, some pharmacists buy and sell nonpharmaceutical merchandise, hire and supervise personnel, and oversee the general operation of the pharmacy. Other pharmacists, however, operate prescription pharmacies that dispense only medicines, medical supplies, and health accessories.

Pharmacists in hospitals and clinics dispense prescriptions and advise the medical staff on the selection and effects of drugs; they also make sterile solutions, buy medical supplies, teach in schools of nursing and allied health professions, and perform administrative duties. An increasing number of pharmacists work as consultants to the medical team in matters related to daily patient care in hospitals, nursing homes, and other health care facilities. Their role is crucial to safe, efficient, and proper therapeutic care.

Some pharmacists, employed as sales or medical service representatives or pharmaceutical detailers by drug manufacturers and wholesalers, sell medicines to retail pharmacies and to hospitals, and inform health personnel about new drugs. Others teach in colleges of pharmacy, supervise the manufacture of pharmaceuticals, or are involved in research and the development of new medicines. Some pharmacists edit or write technical articles for pharmaceutical journals, or do administrative work. Some combine pharmaceutical and legal training in jobs as patent lawyers or consultants on pharmaceutical and drug laws.

Pharmacists often test drugs for purity and strength.

Places of Employment

About 120,000 persons worked as licensed pharmacists in 1976. Over 90,000 pharmacists worked in community pharmacies. Of these, more than two-fifths owned their own pharmacies; the others were salaried employees. Most of the remaining salaried pharmacists worked for hospitals, pharmaceutical manufacturers, and wholesalers. Quite a few community and hospital pharmacists did consulting work for nursing homes and other health facilities in addition to their primary jobs. As a rule, pharmacy services in nursing homes are provided by consultants rather than by salaried employees.

Some pharmacists were civilian employees of the Federal Government, working chiefly in hospitals and clinics of the Veterans Administration and the U.S. Public Health Service. Additional Federal agencies employing pharmacists include the Department of Defense, the Food and Drug Administration and other branches of the Department of Health, Education, and Welfare, and the Drug Enforcement Administration. Other pharmacists served in the Armed Forces or taught in colleges of pharmacy. State and local health agencies, and pharmaceutical and other professional associations, also employ pharmacists.

Most towns have at least one pharmacy with one pharmacist or more in attendance. Most pharmacists, however, practice in or near cities, and in those States that have the largest populations.

Training, Other Qualifications, and Advancement

A license to practice pharmacy is required in all States and the District of Columbia. To obtain a license, one must be a graduate of an accredited pharmacy college, pass a State board examination and—in nearly all States—have a specified amount of practical experience or internship under the supervision of a registered pharmacist. Internships generally are served in a community or hospital pharmacy. In 1976, all States except California, Florida, and Hawaii granted a license without reexamination to qualified pharmacists already licensed by another State. Many pharmacists are licensed to practice in more than one State.

At least 5 years of study beyond high school are required to graduate from one of the degree programs accredited by the American Council on Pharmaceutical Education in the 72 colleges of pharmacy. Most graduates receive a Bachelor of Science (B.S.) or a Bachelor of Pharmacy (B. Pharm.) degree. About one-third of the colleges of pharmacy also offer advanced professional degree programs leading to a Doctor of Pharmacy (Pharm. D.) degree; three of the schools offer only the Pharm. D. degree. The Pharm. D. degree as well as the B.S. or B. Pharm. degrees may serve as the entry degree for purposes of licensure as a pharmacist. The profession is considering standardizing requirements and offering only one professional degree instead of two.

Admission requirements vary. A few colleges admit students directly from high school. Most colleges of pharmacy, however, require entrants to have completed 1 or 2 years of prepharmacy education in an accredited junior college, college, or university. A prepharmacy curriculum usually emphasizes mathematics and basic sciences, such as chemistry, biology, and physics, but also includes courses in the humanities and social sciences. Because entry requirements vary among colleges of pharmacy, prepharmacy students should inquire about and follow the curriculum required by colleges they plan to attend.

The bachelor's degree in pharmacy is the minimum educational qualification for most positions in the profession. An increasing number of students are enrolled in advanced professional programs leading to the Pharm. D. degree. A master's or Ph.

D. degree in pharmacy or a related field usually is required for research work and a Pharm. D., master's, or Ph. D. usually is necessary for administrative work or college teaching. While a number of pharmacy graduates interested in further training pursue a Pharm. D. or a master's or Ph. D. in pharmacy, there are other options. Some enter medical, dental, or law school, and others pursue graduate degrees in science or engineering.

Areas of special study include pharmaceutics and pharmaceutical chemistry (study of physical and chemical properties of drugs an dosage forms), pharmacology (study of the effects of drugs on the body), pharmacognosy (study of the drugs derived from plant or animal sources), hospital pharmacy, clinical pharmacy, and pharmacy administration (study of the social and economic factors related to pharmacy practice). Clinical pharmacy is the synthesis of the basic science education and the application of this knowledge to drug management problems in the care of patients. Courses in pharmacy administration are particularly helpful to pharmacists who enter executive or managerial positions.

All colleges of pharmacy offer courses in pharmacy practice, designed to educate students in the skilled processes required for compounding and dispensing prescriptions, and to give students an appreciation for the profession and an understanding of the responsibilities pharmacists have in their relationships with physicians and patients. Many colleges of pharmacy increasingly are emphasizing direct patient care as well as consultative services to other health professionals in their academic programs.

A limited number of Federal scholarships and loans are available for students studying full time toward a degree in pharmacy. A number of scholarships also are awarded annually by drug manufacturers, chain drugstores, corporations, State and national pharmacy associations, colleges of pharmacy, and other organizations.

Since many pharmacists are self-employed, prospective pharmacists with interest in this type of practice should have some business ability, as well as an interest in medical science and the ability to gain the confidence of their clients. Honesty, integrity, and orderliness are important attributes for the profession. In addition, accuracy is needed to compound and dispense medicines as well as keep records required by law.

Pharmacists often begin as employees in community pharmacies. After they gain experience and obtain the necessary funds they may become owners or part-owners of pharmacies. A pharmacist who gains experience in a chain drugstore may advance to a managerial position, and later to a higher executive position within the company. Hospital pharmacists who have the necessary training and experience may advance to director of pharmacy service or to other administrative positions. Pharmacists in industry often have opportunities for advancement in management, sales, research, quality control, advertising, production, packaging, and other areas.

Employment Outlook

The employment outlook for pharmacists is expected to be favorable through the mid 1980's. However, if the number of pharmacy college graduates continues to rise as rapidly as it has in recent years, the job market may change; graduates may begin to experience competition for jobs. Growth is expected to be about as fast as the average for all occupations. Most openings, however, will result from deaths, retirements, and other separations from the labor force.

Employment will grow as new pharmacies are established, in large residential areas as well as in small towns and rural locations. Many community pharmacies, also, are expected to hire additional pharmacists because of a trend towards shorter working hours. Demand for pharmacists also will be generated by such factors as population growth; increased life expectancy; greater demand for drugs, particularly among the elderly; availability of a wider range of drug products for preventive and therapeutic uses; the rising standard of health care; and the growth of public and private health insurance programs that provide payment for prescription drugs.

Employment of pharmacists in hospitals, nursing homes, and other health facilities is expected to rise faster than in other work settings. Pharmacists increasingly provide direct patient care and consultative services to physicians and other professionals in these health facilities. Because drug manufacturers are experiencing lower rates of return on investment in research and development due to increasing government regulation, pharmacists may face decreasing opportunities in production, research, distribution, and sales. Pharmacists with advanced training will be needed for college teaching and top administrative posts.

Earnings and Working Conditions

Based on limited information, the starting salary for pharmacists generally ranges from $14,000 to $17,000 a year. Experienced pharmacists, particularly owners or managers of pharmacies, often earn considerably more. In general, salaries of experienced pharmacists are higher than the average for all nonsupervisory workers in private industry, except farming.

The minimum entrance salary in the Federal Government for a new graduate with a bachelor's degree from an approved college of pharmacy was $11,523 a year in 1977. However, most graduates qualified for a beginning salary of $14,097 a year; those with 2 years of graduate work, $17,056 a year. Pharmacists with additional years of experience may start at a higher salary. The average salary for all federally employed pharmacists was about $18,600.

The average annual starting salary for pharmacists in hospitals and medical centers was about $14,600 in 1976, according to a survey conducted by the University of Texas Medical School. Top salaries for experienced pharmacists in these settings averaged $18,300, and some were as high as $26,200. Pharmacists who do consulting work in addition to their primary job may have total earnings considerably higher than this.

According to a survey conducted by the American Association of Colleges of Pharmacy, average annual salaries of full-time personnel in colleges of pharmacy during 1977 were as follows: deans, about $36,000; assistant and associate deans, about $25,000; full professors, around $30,000; associate professors, around $23,000; and assistant professors, about $20,000.

Based on the latest Pharmacy Manpower Information Project initiated by the American Association of Colleges of Pharmacy, pharmacists average 44 hours a week in their primary work setting. Many pharmacists work in a secondary setting where they average 15 hours a week. Pharmacists in community settings generally work longer hours than those employed in institutional settings. Pharmacies often are open in the evenings and on weekends, and all States require a registered pharmacist to be in attendance during store hours. Self-employed pharmacists often work more hours than those in salaried positions.

Sources of Additional Information

Additional information on pharmacy as a career, preprofessional and professional requirements, programs offered by colleges of pharmacy, and student financial aid is available from:

American Association of Colleges of Pharmacy, Office of Student Affairs, 4630 Montgomery Ave., Suite 201, Bethesda, Md. 20014.

General information on pharmacy is available from:

American Pharmaceutical Association, 2215 Constitution Ave. NW., Washington, D.C. 20037.

Information about chain drugstores is available from:

National Association of Chain Drug Stores, 1911 Jefferson Highway, Arlington, Va. 22202.

General information on retail pharmacies is available from:

National Association of Retail Druggists, 1750 K St., NW., Washington, D.C. 20006.

For a list of accredited colleges of pharmacy, contact:

American Council on Pharmaceutical Education, One East Wacker Dr., Chicago, Ill. 60601.

Information on requirements for licensure in a particular State is available from the Board of Pharmacy of that State or from:

National Association of Boards of Pharmacy, One East Wacker Dr., Chicago, Ill. 60601.

Information on college entrance requirements, curriculums, and financial aid is available from the dean of any college of pharmacy.

PHOTOGRAPHERS

(D.O.T. 143.062, .282, and .382)

Nature of the Work

Photographers use their cameras and film to portray people, places, and events much as a writer uses words. Those who are skillful can capture the personality of individuals or the mood of scenes which they photograph. Some photographers specialize in scientific, medical, or engineering photography, and their pictures enable thousands of persons to see a world normally hidden from view.

Although their subject matter varies widely, all photographers use the same basic equipment. The most important piece, of course, is the camera, and most photographers own several. Unlike snapshot cameras, which have a lens permanently attached to the camera body, professional cameras are constructed to use a variety of lenses designed for closeup, medium-range, or distance photography.

Besides cameras and lenses, photographers use a variety of film and colored filters to obtain the desired effect under different lighting conditions. When taking pictures indoors or after dark, they use electronic flash units, floodlights, reflectors, and other special lighting equipment.

Some photographers develop and print their own photographs in the darkroom and may enlarge or otherwise alter the basic image. Many photographers send their work to photographic laboratories for processing.

Because the procedures involved in still photography are quite different from those in motion picture photography, many photographers specialize in one or the other. However, there is a growing demand for photographers who have training in both areas.

In addition to knowing how to use their equipment and materials, photographers must be capable of composing the subjects of their photographs and recognizing a potentially good photograph.

Many photographers specialize in a particular type of photography, such as portrait, commercial, or industrial work. Portrait photographers take pictures of individuals or groups of persons and often work in their own studios. For special events, such as weddings or christenings, however, they take photographs in churches and homes. Portrait photographers in small studios frequently do all the operations, including scheduling appointments and setting up and adjusting equipment before

Commercial photographers must be imaginative and original.

taking the pictures, as well as developing and retouching negatives, developing proofs, and mounting and framing pictures. They also may be the ones to collect payments and keep records, and therefore must be good business persons.

Commercial photographers photograph a wide range of subjects including livestock, manufactured articles, buildings, and large groups of people. They frequently do photography for catalogs. Those in advertising take pictures to promote such items as clothing, furniture, automobiles, and food, and may specialize in one such area. Advertising photographers must know how to use many different photographic techniques.

The work of industrial photographers is used in company publications to report to stockholders or to advertise company products or services. Industrial photographers also photograph groups of people for employee news magazines or may take motion pictures of workers operating equipment and machinery for management's use in analyzing production or work methods. They may also use special photographic techniques as research tools. For example, medical researchers often use ultraviolet and infrared photography, fluorescence, and X-rays to obtain information not visible under normal conditions. Time lapse photography (where time is stretched or condensed), photomicrography (where the subject of the photography may be magnified 50 or 70 times or more), and photogrammetry (surveying an area using aerial photography) are other special techniques.

Other photographic specialties include photojournalism, or press photography, which combines a "nose for news" with photographic ability; and educational photography (preparing slides, filmstrips, and movies for use in the classroom).

Places of Employment

About 85,000 photographers were employed in 1976. The greatest proportion worked in commercial studios; many others worked for newspapers and magazines. Government agencies, photographic equipment suppliers and dealers, and industrial firms also employed large numbers of photographers. In addition, some photographers taught in colleges and universities, or made films. Still others worked freelance, taking pictures to sell to advertisers, magazines, and other customers. About one-third of all photographers were self-employed.

Jobs for photographers are found in all parts of the country—both small towns and large cities—but are concentrated in the more populated areas.

Training, Other Qualifications, and Advancement

Photographic training is available in colleges, universities, junior colleges, and art schools. Over 75 colleges and universities offer 4-year curriculums leading to a bachelor's degree in photography. Some colleges and universities grant master's degrees in specialized areas, such as photojournalism. In addition, some colleges have 2-year curriculums leading to a certificate or an associate degree in photography. A formal education in photography gives a solid fundamental background in a variety of equipment, processes, and techniques. Art schools offer useful training in design and composition, but not the technical training needed for professional photographic work. (See the statement on commercial artists elsewhere in the *Handbook*.) The Armed Forces also train many young people in photographic skills.

Although a high school education is desirable, the photography profession has no set entry requirements with regard to formal education or training. However, the training a prospective photographer has determines the type of work for which he or she qualifies.

People may prepare for work as photographers in a commercial studio through 2 or 3 years of on-the-job training as a photographer's assistant. Trainees generally start in the darkroom where they learn to mix chemicals, develop film, and do photoprinting and enlarging. Later they may set up lights and cameras or help an experienced photographer take pictures.

Amateur experience is helpful in getting an entry job with a commercial studio, but post-high school education and training usually are needed for industrial or scientific photography. Here success in photography depends on being more than just a competent photographer, and adequate career preparation requires some knowledge of the field in which the photography is used. For example, work in scientific, medical, and engineering research, such as photographing microscopic organisms, requires a background in the particular science or engineering specialty as well as skill in photography.

Photographers must have good eyesight and color vision, artistic ability, and manual dexterity. They also should be patient and accurate and enjoy working with detail. Some knowledge of mathematics, physics, and chemistry is helpful for understanding the use of various lenses, films, light sources, and development processes.

Some photographic specialties require additional qualities. Commercial or freelance photographers must be imaginative and original in their thinking. Those who specialize in photographing news stories must be able to recognize a potentially good photograph and act quickly, for otherwise an opportunity to capture an important event on film may be lost. Photographers who specialize in portrait photography need the ability to help people relax in front of the camera.

Newly hired photographers are given relatively routine assignments that do not require split-second camera adjustments or decisions on what subject matter to photograph. News photographers, for example, may be assigned to cover civic meetings or photograph snow storms. After gaining experience they advance to more demanding assignments, and some may move to staff positions on national news magazines. Photographers with exceptional ability may gain national recognition for their work and exhibit their photographs in art and photographic galleries, or publish them in books. A few industrial or scientific photographers may be promoted to supervisory positions. Magazine and news photographers may eventually become heads of graphic arts departments or photography editors.

Employment Outlook

Employment of photographers is expected to grow more slowly than the average for all occupations through the mid-1980's. In addition to openings resulting from growth, others will occur each year as workers die, retire, or transfer to other occupations.

Growth of employment in business and industry is occurring as greater importance is placed upon visual aids for use in meetings, stockholders' reports, sales campaigns, and public relations work. Video and motion picture photography are becoming increasingly important in industry. Photography also is becoming an increasingly important part of law enforcement work, as well as scientific and medical research, where opportunities are expected to be good for those possessing a highly specialized background.

The employment of portrait and commerical photographers is expected to grow slowly, and competition for jobs as portrait and commercial photographers and photographers' assistants is expected to be keen. These fields are relatively crowded since photographers can go into business for themselves with a modest financial investment, or work part time while holding another job. The increased use of self-processing cameras in commercial photography also has contributed to the crowding in this field, since little photographic training is required for such work.

Earnings and Working Conditions

Beginning photographers who worked for newspapers that have contracts with The Newspaper Guild had weekly earnings between $128 and $432 in 1976, with the majority earning between $175 and $225. Newspaper photographers with some experience (usually 4 or 5 years) averaged about $320 a week in 1976. Almost all experienced newspaper photographers earned over $225; the top salary was nearly $505 a week.

Photographers in the Federal Government earned an average of $14,900 a year in 1976. Depending on their level of experience, newly hired photographers in the Federal Government earned from $8,320 to $11, 520 a year. Most experienced photographers earned between $11,520 and about $18,460 a year.

Experienced photographers generally earn salaries that are above the average for nonsupervisory workers in private industry, except farming. Although self-employed and freelance photographers often earn more than salaried workers, their earnings are affected greatly by general business conditons and the type and size of their community and clientele.

Photographers who have salaried jobs usually work a 5-day, 35-40 hour week and receive benefits such as paid holidays, vacations, and sick leave. Those in business for themselves usually work longer hours. Freelance, press, and commercial photographers travel frequently and may have to work in uncomfortable surroundings. Sometimes the work can be dangerous, especially for news photographers assigned to cover stories on natural disasters or military conflicts.

Sources of Additional Information

Career information on photography is available from:

Photographic Art & Science Foundation, 111 Stratford Rd., Des Plaines, Ill. 60016.

Professional Photographers of America, Inc. 1090 Executive Way, Des Plaines, Ill. 60018.

PHYSICAL THERAPISTS

(D.O.T. 079.378)

Nature of the Work

Physical therapists help persons with muscle, nerve, joint, and bone diseases or injuries to overcome their disabilities. Their patients include accident victims, crippled children, and disabled older persons. Physical therapists perform and interpret tests and measurements for muscle strength, motor development, functional capacity, and respiratory and circulatory efficiency to develop programs for treatment in cooperation with the patient's physician. They evaluate the effectiveness of the treatment and discuss the patients' progress with physicians, psychologists, occupational therapists, and other specialists. When advisable, physical therapists revise the therapeutic procedures and treatments. They help disabled persons to accept their physical handicaps and adjust to them. They show members of the patients' families how to continue treatments at home.

Therapeutic procedures include exercises for increasing strength, endurance, coordination, and range of motion; electrical stimuli to activate paralyzed muscles; instruction in carrying out everyday activities and in the use of helping devices; and the application of massage, heat and cold, light, water, or electricity to relieve pain or improve the condition of muscles and skin.

Most physical therapists provide direct care to patients as staff members, supervisors, or self-employed practitioners. Physical therapists usually perform their own evaluations of patients; in large hospitals and nursing homes, however, the director or assistant director of the physical therapy department may handle this work, which requires extensive training and experience. Therapists may treat patients with a wide variety of problems, or they may specialize in pediatrics, geriatrics, amputations, arthritis, or paralysis. Others teach or are consultants.

Places of Employment

About 25,000 persons worked as licensed physical therapists in 1976. The largest number work in hospitals. Nursing homes employ a growing number of physical therapists, and also contract for the services of self-employed therapists. Others work in rehabilitation centers or

Physical therapists develop programs for treatment of disabled persons of all ages.

schools for crippled children. Some who work for public health agencies treat chronically sick patients in their own homes. Still others work in physicians' offices or clinics, teach in physical therapy educational programs, or work for research organizations. A few serve as consultants in government and voluntary agencies or are members of the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license to practice physical therapy. Applicants for a license must have a degree or certificate from an accredited physical therapy educational program and to qualify must pass a State board examination. Applicants may prepare for State board examinations in physical therapy through one of three types of programs, depending upon previous academic study. High school graduates can earn a 4-year bachelor's degree in physical therapy at a college or university. Students who already hold a bachelor's degree in another field, such as biology or physical education, can earn a second bachelor's degree or a certification in physical therapy through special programs lasting 12 to 16 months. These applicants also have the option of working for a master's degree in physical therapy.

In 1976, 11 certificate programs, 76 bachelor's degree programs and 5 master's degree programs were accredited by the American Physical Therapy Association and the American Medical Association to provide entry level training. There were also 17 other master's degree programs that provided advanced training to those already in the field. One of the certificate programs is sponsored jointly by the U.S. Army and Baylor University; graduates are commissioned as officers in the Army.

The physical therapy curriculum includes science courses such as anatomy, physiology, neuroanatomy, and neurophysiology; it also includes specialized courses such as biomechanics of motion, human growth and development, and manifestations of disease and trauma. Besides receiving classroom instruction, students get supervised clinical experience administering physical therapy to patients in a hospital or treatment center.

Competition for entry to all physical therapy programs is keen. Institutions offering a physical therapy program each year receive many more applications than the number of existing places. Consequently, students seriously interested in attending a physical therapy program must attain superior grades in their earlier studies, especially in science courses.

Personal traits that physical therapists need include patience, tact, resourcefulness, and emotional stability to help patients and their families understand the treatments and adjust to their handicaps. Physical therapists also should have manual dexterity and physical stamina. Many persons who want to determine whether they have the personal qualities needed for this occupation volunteer for summer or part-time work in the physical therapy department of a hospital or clinic. High school courses that are useful include health, biology, social science, mathematics, and physical education.

A graduate degree combined with clinical experience increases opportunities for advancement, especially to teaching, research, and administrative positions.

Employment Outlook

Employment of physical therapists is expected to grow faster than the average for all occupations through the mid-1980's because of increased public recognition of the importance of rehabilitation. As programs to aid crippled children and other rehabilitation activities expand, and as growth takes place in nursing homes and other facilities for the elderly, many new positions for physical therapists are likely to be created. Many part-time positions should continue to be available.

However, the rapidly growing number of new graduates is expected to exceed the number of openings that will occur each year due to growth in the occupation and replacement of those who will die or retire. As a result, new graduates are expected to face some competition through the mid-1980's. Employment opportunities will be best in surburban and rural areas.

Earnings and Working Conditions

Starting salaries for new physical therapy graduates averaged about $11,200 a year in 1976, according to a national survey conducted by the University of Texas Medical School. Earnings of experienced physical therapists averaged about $14,000, about one and a half times as much as average earnings for all nonsupervisory workers in private industry, except farming.

Beginning therapists employed by the Veterans Administration (VA) earned starting salaries of $10,473 a year in 1977. The average salary paid therapists employed by the VA in 1977 was $15,700 annually; supervisory therapists may earn over $20,000.

Sources of Additional Information

Additional information on a career as a physical therapist and a list of accredited educational programs in physical therapy are available from:

American Physical Therapy Association, 1156
15th St. NW., Washington, D.C. 20005.

PHYSICIANS

(D.O.T. 070.101 and .108)

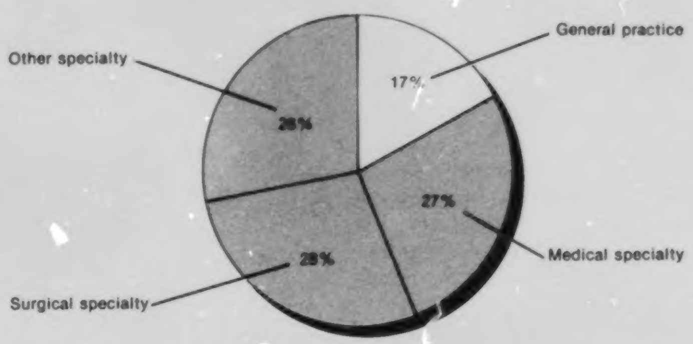
Nature of the Work

Physicians perform medical examinations, diagnose diseases, and treat people who are suffering from injury or disease. They also try to prevent illness by advising patients on selfcare related to diet and exercise. Physicians generally examine and treat patients in their own offices and in hospitals, but they also may visit patients at home.

A decreasing percentage of the physicians who provide patient care are general practitioners (about 15 percent in 1976); most specialize in one of the 34 fields for which there is graduate training. The largest specialties are internal medicine, general surgery, obstetrics and gynecology, psychiatry, pediatrics, radiology, anesthesiology, ophthalmology, pathology, and orthopedic surgery. The most rapidly growing

Specialists outnumber general practitioners by 5 to 1

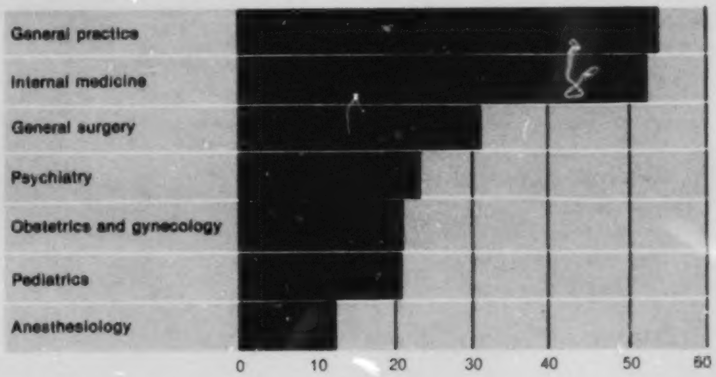
Percent of physicians by specialty group, 1975



Source: American Medical Association

Almost two-thirds of all physicians practice in the seven largest specialties

Number of physicians, 1975 (in thousands)



Source: American Medical Association

specialty is family practice which emphasizes general medicine.

Some physicians combine the practice of medicine with research or teaching in medical schools. Others hold full-time research or teaching positions or perform administrative work in hospitals, professional associations, and other organizations. A few are primarily engaged in writing and editing medical books and magazines.

Places of Employment

About 360,000 physicians were professionally active in the United States in 1976—almost [illegible] providing patient care [illegible]. Nearly 215,000 of these had [illegible] practices; more than 94,000 others worked as residents or full-time staff in hospitals. The remaining physicians—about 28,000—taught or performed administrative or research duties.

In 1975, 19,000 graduates of foreign medical schools served as hospital residents in this country. To be appointed to approved residencies in U.S. hospitals, these graduates, except in special instances, must obtain a certificate after passing an examination given by the Educational Commission for Foreign Medical Graduates.

The Northeastern States have the highest ratio of physicians to population and the Southern States the lowest. Because physicians have tended to locate in urban areas, close to hospital and educational centers, many rural areas have been underserved by medical personnel. Currently, more medical students are being exposed to practice in rural communities with the direct support of educational centers and hospitals in more populous areas. In addition, some rural areas offer physicians guaranteed minimum incomes to offset the relatively low earnings typical in rural medical practice.

Training and Other Qualifications

All States, the District of Columbia, and Puerto Rico require a license to practice medicine. Requirements for licensure include graduation from an accredited medical school, successful completion of a licensing examination, and, in most States, a period of 1 or 2 years in an accredited graduate medical education program (residency). The licensing examination taken by most graduates of U.S. medical schools is the National Board of Medical Examiners (NBME) test. Licensure applicants who have not taken the NBME test must be sponsored by a State in order to sit for the Federation Licensure Examination (FLEX) that is accepted by all jurisdictions. Although physicians licensed in one State usually can get a license to practice in another without further examination, some States limit this reciprocity.

Competition for entry into medical school is intense even though the number of schools has increased.

In 1976, there were 116 accredited schools in the United States in which students could begin the study of medicine. Of these, 114 awarded the degree of Doctor of Medicine (M.D.); two schools offered a 2-year program in the basic medical sciences to students who could then transfer to regular medical schools for the last semesters of study.

The minimum educational requirement for entry to a medical school is 3 years of college; some schools require 4 years. A few medical schools allow selected students who have exceptional qualifications to begin their professional study after 2 years of college. Most students who enter medical schools have a bachelor's degree.

Required premedical study includes undergraduate work in English, physics, biology, and inorganic and organic chemistry. Students should take courses in the humanities, mathematics, and the social sciences to acquire a broad general education.

Medicine is a popular field of study, and competition for entry to medical school is intense. In 1976, there were about 42,000 applicants for only 15,613 positions. Almost all of those accepted had premedical college grades averaging 'B' or better. Other factors considered by medical schools in admitting students include their scores on the New Medical College Admission Test, which is taken by almost all applicants. Consideration also is given to the applicant's character, personality, and leadership qualities, as shown by personal interviews, letters of recommendation, and extracurricular activities in college. Many State-supported medical schools give preference to residents of their particular States and, sometimes, those of nearby States.

Most medical students take 4 years to complete the curriculum for the M.D. degree. Many schools, however, allow students who have demonstrated outstanding ability to follow a shortened curriculum, generally lasting 3 years. A few schools offer the M.D. degree within 6 years of high school graduation.

The first semesters of medical school training are spent primarily in laboratories and classrooms, learning basic medical sciences such as anatomy, biochemistry, physiology, pharamacology, microbiology, and pathology. Additionally, many schools are integrating some clinical experience with patients into the first 2 years of study. During the last semesters, students spend the majority of their time in hospitals and clinics under the supervision of experienced physicians. They learn to take case histories, perform examinations, and recognize diseases.

After graduating from medical school, almost all M.D.'s serve a 1- or 2-year residency. Those planning to work in general practice often spend an additional year in a hospital residency. Those seeking certification in a specialty spend from 2 to 4 years—depending on the specialty—in advanced residency training, followed by 2 years of practice or more in the specialty. Then they must pass the specialty board examinations. Some physicians who want to teach or do research take graduate work leading to a master's or Ph. D. degree in a field such as biochemistry or microbiology.

Medical training is very costly because of the long time required to earn the medical degree. However, financial assistance in the form of loans and scholarships is available primarily from the Federal Government, and to a lesser extent from State and local government and private sources. Some of this aid requires the student to commit a minimum of 2 years' time to Federal service upon graduation and/or to establish financial need.

Persons who wish to become physicians must have a strong desire to serve the sick and injured. They must be willing to study a great deal to keep up with the latest advances in medical science. Sincerity and a pleasant personality are assets that help physicians gain the confidence of patients. Prospective physicians should be emotionally stable and able to make decisions in emergencies

The majority of newly qualified physicians open their own offices or join associate or group practices. Those who have completed 1 year of graduate medical education (a 1-year residency) and enter active military duty initially serve as captains in the Army or Air Force or as lieutenants in the Navy. Graduates of medical schools are eligible for commissions as senior assistant surgeons (equivalent to lieutenants in the Navy) in the U.S. Public Health Service, as well as for Federal Civil Service professional medical positions.

Employment Outlook

The employment outlook for physicians is expected to be very good through the mid-1980's. However, anticipated increases in the numbers of graduates of existing and developing U.S. medical schools, combined with foreign medical graduate entrants, point to a greatly improved supply situation. This may result in an increasing movement of physicians into rural and other areas that have experienced shortages in the past. Also, some specialties will have sufficient numbers of practitioners by 1980 or 1985 so that new graduates will be encouraged to specialize in one of the primary care areas such as family practice, pediatrics, or internal medicine.

Growth in population will create much of the need for more physicians, and a larger percentage of the population will be in the age group over 65, which uses more physicians' services. Also, the effective demand for physicians' care will increase because of greater ability to pay, resulting from extension of prepayment programs for hospitalization and medical care, including Medicare and Medicaid, and continued Federal Government provision of medical care for members of the Armed Forces, their families, and veterans. More physicians will be needed, in addition, for medical research, teaching in medical schools, and the continuing growth in the fields of public health, rehabilitation, industrial medicine, and mental health.

To some extent, the rise in the demand for physicians' services will be offset by developments that will enable physicians to care for more patients. For example, increasing numbers of medical technicians are assisting physicians; new drugs and new medical techniques are shortening illnesses; and growing numbers of physicians are using their time more effectively by engaging in group practice.

The extent to which the developing health occupations, such as those of physicians' assistants and nurse practitioners, will enable each physician to treat more patients is still unknown. It is possible that these new health personnel will increase physicians' productivity significantly.

The net effect of expected growth in requirements for physicians and of increases in their number and productivity is likely to be an improved availability of medical care. New physicians will have little difficulty establishing practices, however.

Even in the unlikely event that some urban areas become overserved and need no additional doctors, many remote and rural areas are without M.D.'s. If some proposed incentives are implemented, physicians may be able to practice in these underserved areas without forfeiting access to consultation with specialists and without earning an income significantly below that of most colleagues located in cities.

Earnings and Working Conditions

Salaries of medical school graduates serving as residents in hospitals vary according to the type of residency, geographic area, and size of hospital, but earnings of $12,000 to $13,000 a year are common. Many hospitals also provide full or partial room, board, and other maintenance allowances to their residents.

Graduates who have completed an approved 3-year residency but have no other experience could expect to start working at a Veterans Administration hospital for an annual salary of between $27,000 and $31,500 a year in 1977. In addition, those who work full time could expect another $5,500 to $5,800 in other cash benefits or "special" payments.

Newly qualified physicians who establish their own practice must make a sizable financial investment to equip a modern office. During the first year or two of independent practice, physicians probably earn little more than the minimum needed to pay expenses. As a rule, however, their earnings rise rapidly as their practice develops.

Physicians have the highest average annual earnings of any occupational group. The net income of physicians who provided patient care services averaged almost $54,000 in 1976, according to the limited information available. Earnings of physicians depend on factors such as the region of the country in which they practice; the patients' income levels; and the physician's skill, personality, and professional reputation, as well as the length of experience. Self-employed physicians usually earn more than those in salaried positions, and specialists usually earn considerably more than general practitioners. Many physicians have long working days and irregular hours. Most specialists work fewer hours each week than general practitioners. As doctors grow older, they may accept fewer new patients and tend to work shorter hours. However, many continue in practice well beyond 70 years of age.

Sources of Additional Information

Persons who wish to practice in a given State should find out about the requirements for licensure directly from the board of medical examiners of that State. Information on Federal scholarships and loans is available from the director of student financial aid at the individual medical schools. For a list of approved medical schools, as well as general information on premedical education, financial aid, and medicine as a career, contact:

Council on Medical Education, American Medical Association, 535 N. Dearborn St., Chicago, Ill. 60610.

Association of American Medical Colleges, Suite 200, One Dupont Circle, NW., Washington, D.C. 20036.

PHYSICISTS

(D.O.T. 023.081 and.088)

Nature of the Work

The flight of astronauts through space, the probing of ocean depths, or even the safety of the family car depend on research by physicists. Through systematic observation and experimentation, physicists describe in mathematical terms the structure of the universe and interaction of matter and energy. Physicists develop theories that describe the fundamental forces and laws of nature. Determining such basic laws governing phenomena such as gravity, electromagnetism, and nuclear interaction leads to discoveries and innovations. For instance, the development of irradiation therapy equipment which destroys harmful growths in humans without damaging other tissues resulted from what physicists know about nuclear radiation. Physicists have contributed to scientific progress in recent years in areas such as nuclear energy, electronics, communications, aerospace, and medical instrumentation.

The majority of all physicists work in research and development. Some do basic research to increase scientific knowledge. For example, they investigate the fundamentals of nuclear structure and the forces between nucleons (nuclear dynamics). The equipment that physicists design for their basic research can often be applied to other areas. For example, lasers (devices that amplify light and emit electromagnetic waves in a narrow, intense light beam) are utilized in surgery; microwave devices are used for ovens; and measurement techniques and instruments developed by physicists can detect and measure the kind and number of cells in blood or the amount of mercury or lead in foods.

Some engineering-oriented physicists do applied research and help develop new products. For instance, their knowledge of solid-state physics led to the development of transistors and microcircuits used in electronic equipment that ranges from hearing aids to missile guidance systems.

Many physicists teach and do research in colleges and universities. A small number work in inspection, quality control, and other production-related jobs in industry. Some do consulting work.

Most physicists specialize in one branch or more of the science—elementary-particle physics; nuclear physics; atomic, electron, and molecular physics; physics of condensed matter; optics, acoustics, and plasma physics; and the physics of fluids. Some specialize in a subdivision of one of these branches. For example, within solid-state physics subdivisions include ceramics, crystallography, and semiconductors. However, since all physics specialties rest on the same fundamental principles, a physicist's work usually overlaps several specialties.

Growing numbers of physicists are specializing in fields combining physics and a related science—such as

Physicist developing a coating for optical fibers.

astrophysics, biophysics, chemical physics, and geophysics. Furthermore, the practical applications of physicists' work have increasingly merged with engineering.

Places of Employment

About 48,000 people worked as physicists in 1976. Private industry employed nearly one out of three physicists, primarily in companies manufacturing chemicals, electrical equipment, and aircraft and missiles. Many others worked in hospitals, commercial laboratories, and independent research organizations.

Nearly one-half of all physicists taught or did research in colleges and universities; some did both. About 8,000 physicists were employed by the Federal Government in 1976, mostly in the Departments of Defense and Commerce.

Although physicists are employed in all parts of the country, their employment is greatest in areas that have heavy industrial concentrations and large college and university enrollments. Nearly one-fourth of all physicists work in four metropolitan areas—Washington, D.C.; Boston, Mass.; New York, N.Y.; and Los Angeles-Long Beach, Calif., and more than one-third are concentrated in three States—California, New York, and Massachusetts.

Training, Other Qualifications, and Advancement

Graduate training in physics or a closely related field is almost essential for most entry level jobs in physics and for advancement in all types of work. The doctorate usually is required for full faculty status at colleges and universities and for industrial or government jobs administering research and development programs.

Those having master's degrees qualify for many research jobs in private industry and in the Federal Government. Some work in colleges and universities, instructing and assisting in research while studying for their Ph. D.

Those having bachelor's degrees qualify for some applied research and development jobs in private industry and in the Federal Government. Some are employed as research assistants in colleges and universities while studying for advanced degrees. Many with a bachelor's degree in physics apply their physics training primarily in jobs in engineering and other scientific fields. (See statements on engineers, geophysicists, programmmers, and systems analysts elsewhere in the *Handbook*.)

Over 800 colleges and universities offer a bachelor's degree in physics. In addition, many engineering schools offer a physics major as part of the general curriculum. The undergraduate program in physics provides a broad background in the science and serves as a base for later specialization either in graduate school or on the job. Some typical physics courses are mechanics, electricity and magnetism, optics, thermodynamics, and atomic and molecular physics. Students also take courses in chemistry and require many courses in mathematics.

About 300 colleges and universities offer advanced degrees in physics. In graduate school, the student, with faculty guidance, usually works in a specific field. The graduate student, especially the candidate for the Ph. D. degree, spends a large portion of his or her time in research.

Students planning a career in physics should have an inquisitive mind, mathematical ability, and imagination. They should be able to work on their own, since physicists, particularly in basic research, often receive only limited supervision.

Physicists often begin their careers doing routine laboratory tasks. After some experience, they are assigned more complex tasks and may advance to work as project leaders or research directors. Some work in top management jobs. Physicists who develop new products frequently form their own companies or join new firms to exploit their own ideas.

Employment Outlook

Employment opportunities in physics are expected to be favorable through the mid-1980's for persons with graduate degrees in physics. Although employment of physicists is expected to grow more slowly than the average for all occupations over the period, fewer physicists are expected to enter the labor force than in the past. The number of graduate degrees awarded annually in physics has been declining since 1970, and this trend is expected to continue through the mid-1980's. Most job openings will arise as physicists retire, die, or transfer to other occupations.

Many physicists work in research and development (R&D). The anticipated rapid increase in R&D expenditures through the mid-1980's should result in increased requirements for physicists. If actual R&D expenditure levels and patterns were to differ significantly from those assumed, however, the outlook for physicists would be altered.

Some physicists with advanced degrees will be needed to teach in colleges and universities, but competition for these jobs is expected to be keen. The number of teaching jobs is expected to decline as the number of physics degrees awarded falls over the 1976 to 1985 period.

Persons with only a bachelor's degree in physics are expected to face keen competition for physicist jobs through the mid-1980's. Some new graduates will find employment as engineers or technicians. Others will find opportunities as high school physics teachers after completing the required educational courses and obtaining a State teaching certificate. However, they are usually regarded as teachers rather than as physicists. (See statement on secondary school teachers elsewhere in the *Handbook*.)

Earnings and Working Conditions

Physicists have relatively high salaries, with average earnings more than twice those of nonsupervisory workers in private industry, except farming. Starting salaries for physicists who had a bachelor's degree averaged about $12,600 a year in manufacturing industries in 1976; a master's degree, $13,600; and a Ph. D., $19,000.

Depending on their college records, physicists with a bachelor's degree could start in the Federal Government in 1977, at either $9,303 or $11,523 a year. Beginning physicists having a master's degree could start at $11,523 or $14,097, and those having the Ph. D. degree could begin at $17,056 or $20,442. Average earnings for all physicists in the Federal Government in 1977 were $23,850 a year.

Starting salaries on college and university faculties for physicists having a master's degree averaged $10,800 in 1976, and for those having the Ph. D., $12,800. (See statement on college and university teachers elsewhere in the *Handbook*.) Many faculty physicists supplement their regular incomes by working as consultants and taking on special research projects.

Sources of Additional Information

General information on career opportunities in physics is available from:

American Institute of Physics, 335 East 45th St., New York, N.Y. 10017.

For information on Federal Government careers, contact:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20415.

PODIATRISTS

(D.O.T. 079.108)

Nature of the Work

Podiatrists diagnose and treat foot diseases and deformities. They perform surgery, fit corrective devices, and prescribe drugs, physical therapy, and proper shoes. To help in diagnoses, they take X-rays and perform or prescribe blood and other pathological tests. Among the conditions podiatrists treat are corns, bunions, calluses, ingrown toenails, skin and nail diseases, deformed toes, and arch disabilities. They refer patients to medical doctors whenever the feet show symptoms of medical disorders affecting other parts of the body—such as arthritis, diabetes, or heart disease—while continuing to treat for the foot problem.

Some podiatrists specialize in foot surgery, orthopedics (bone, muscle, and joint disorders), podopediatrics (children's foot ailments), or podogeriatrics (foot problems of the elderly). However, most provide all types of foot care.

Places of Employment

About 7,500 persons practiced podiatry in 1976, most of them located in large cities. Those who had full-time salaried positions worked mainly in hospitals, podiatric medical colleges, or for other podiatrists. The Veterans Administration and public health departments employ podiatrists on either a full- or part-time basis. Others serve as commissioned officers in the Armed Forces.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require a license for the practice of podiatry. To qualify for a license, an applicant must graduate from an accredited college of podiatric medicine and pass a written and oral State board proficiency examination. Four States—Georgia, Michigan, New Jersey, and Rhode Island—also require applicants to serve a 1-year residency in a hospital or clinic after graduation. Three-fourths of the States grant licenses without further examination to podiatrists licensed by another State.

Minimum entrance requirements at the colleges of podiatric medicine include 3 years of college work with courses in English, chemistry, biology or zoology, physics, and mathematics. Most entrants to podiatry schools have completed at least 3 years of college. Competition for entry to these schools is strong, however, and most entrants surpass the minimum requirements. More than 90 percent of the entering class of 1976 held at least a bachelor's degree, and the average enrollee had an overall grade point average of 'B' or better. All colleges of podiatric medicine require applicants to take the New Medical College Admissions Test. Of the 4 years in podiatry school, the first 2 are spent in classroom instruction and laboratory work in anatomy, bacteriology, chemistry, pathology, physiology, pharmacology, and other basic sciences. During the final 2 years, students obtain clinical experience while continuing their academic studies. The degree of Doctor of Podiatric Medicine (D.P.M.) is

Podiatrists diagnose and treat foot problems.

awarded upon graduation. Additional education and experience generally are necessary to practice in a specialty. Federal, State, and private loans are available for needy students to pursue full-time study leading to a degree in podiatric medicine.

Persons planning a career in podiatry should have scientific aptitude and manual dexterity, and like detailed work. A good business sense and congeniality also are assets in the profession.

Most newly licensed podiatrists set up their own practices. Some purchase established practices, or obtain salaried positions to gain the experience and money needed to begin their own.

Employment Outlook

Opportunities for graduates to establish new practices, as well as to enter salaried positions, should be favorable through the mid-1980's.

Employment of podiatrists is expected to grow about as fast as the average for all occupations as an expanding population demands more health services. The growing number of older people who need foot care and those who are entitled to certain podiatrists' services under Medicare, also is expected to spur demand for podiatric services. More podiatrists will be needed to work in hospitals, extended care facilities, and public health programs.

Earnings and Working Conditions

Newly licensed podiatrists build their practices over a number of years. Income during the first several years will be less than in later years. The average income of all podiatrists, after expenses but before taxes, was over $42,000 in 1976, according to the limited information available.

The workweek of podiatrists is generally 40 hours, and they may set their hours to suit their practice.

Sources of Additional Information

Information on license requirements in a particular State is available from that State's board of examiners in the State capital.

Information on colleges of podiatric medicine, entrance requirements, curriculums, and student financial aid is available from:

American Association of Colleges of Podiatric Medicine, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

For additional information on podiatry as a career, contact:

American Podiatry Association, 20 Chevy Chase Circle, NW., Washington, D.C. 20015.

POLICE OFFICERS

(D.O.T. 375.118 through .868, and 377.868)

Nature of the Work

The security of our Nation's cities and towns greatly depends on the work of local police officers whose jobs range from controlling traffic to preventing and investigating crimes. Whether on or off duty, these officers are expected to exercise their authority whenever necessary.

Police officers often work independently in carrying out their duties.

Police officers who work in a small community have many duties. In the course of a day's work, they may direct traffic at the scene of a fire, investigate a housebreaking, and give first aid to an accident victim. In a large police department, by contrast, officers usually are assigned to a specific type of duty. Most officers are detailed either to patrol or to traffic duty; smaller numbers are assigned to special work such as accident prevention or operation of communications systems. Others work as detectives (plainclothes officers) assigned to criminal investigation; still others, as experts in chemical and microscopic analysis, firearms identification, and handwriting and fingerprint identification. In very large cities, a few officers may work with special units such as mounted and motorcycle police, harbor patrols, helicopter patrols, canine corps, mobile rescue teams, and youth aid services.

Most new recruits begin on patrol duty. Recruits may be assigned to such varied areas as congested business districts or outlying residential areas. They may cover their beats alone or with other officers. They may ride in a police vehicle or walk on "foot" patrol. In any case, they become thoroughly familiar with conditions throughout their area and, while on patrol, remain alert for anything unusual. They note suspicious circumstances, such as open windows or lights in vacant buildings, as well as hazards to public safety such as burned-out street lights or fallen trees. Officers also watch for stolen automobiles and enforce traffic regulations. At regular intervals, they report to police headquarters through call boxes, by radio, or by walkie-talkie. They prepare reports about their activities and may be called on to testify in court when cases result in legal action.

Places of Employment

About 500,000 full-time officers worked for local police departments in 1976. Some cities have very large police forces. For example, New York has about 30,000 police officers and Chicago has nearly 13,000. Hundreds of small communities employ fewer than 25 officers each.

Training, Other Qualifications, and Advancement

Local civil service regulations govern the appointment of police officers in practically all large cities and in many small ones. Candidates must be U.S. citizens, usually at least 21 years of age, and must meet certain height and weight standards. Eligibility for appointment depends on performance in competitive examinations as well as on education and experience. The physical examinations often include tests of strength and agility.

Because personal characteristics such as honesty, good judgment, and a sense of responsibility are especially important in police work, candidates are interviewed by a senior officer at police headquarters, and their character traits and background are investigated. In some police departments, candidates also may be interviewed by a psychiatrist or a pyschologist, or be given a personality test. Although police officers work independently, they must perform their duties in line with laws and departmental rules. They should enjoy working with people and serving the public.

In large police departments, where most jobs are found, applicants usually must have a high school education. A few cities require some college training and some hire law enforcement students as police interns. A few police departments accept applicants who have less than a high school education as recruits, particularly if they have worked in a field related to law enforcement.

More and more, police departments are encouraging applicants to take post-high school training in sociology and psychology. As a result, more than 1,000 junior colleges, colleges, and universities now offer programs in law enforcement or criminal justice. Other courses helpful in preparing for a police career include English, American history, civics and government, business law, and physics. Physical education and sports are especially helpful in developing the stamina and agility needed for police work.

In some large cities, young persons who have completed high school can enter police work as police cadets, or trainees, while still in their teens. As paid civilian employees of the police department, they attend classes to learn police skills and do clerical work. They may be appointed to the regular force at age 21 if they have all the necessary qualifications.

Before their first assignments, officers usually go through a period of training. In small communities, recruits learn by working for a short time with experienced officers. Training provided in large city police departments is more formal and may last several weeks or a few months. This training includes classroom instruction in constitutional law and civil rights; in State laws and local ordinances; and in accident investigation, patrol, and traffic control. Recruits learn how to use a gun, defend themselves from attack, administer first aid, and deal with emergencies.

Police officers usually become eligible for promotion after a specified length of service. In a large department, promotion may allow an officer to specialize in one type of police work such as laboratory work, traffic control, communications, or work with juveniles. Promotions to the rank of sergeant, lieutenant, and captain usually are made according to a candidate's position on a promotion list, as determined by scores on a written examination and on-the-job performance.

Many types of training help police officers improve their performance on the job and prepare for advancement. Through training given at police department academies and colleges, officers keep abreast of crowd-control techniques, civil defense, legal developments that affect their work, and advances in law enforcement equipment. Many police departments encourage officers to work toward college degrees, and some pay all or part of the tuition.

Employment Outlook

Police work is attractive to many. The job frequently is challenging and involves much responsibility. Furthermore, layoffs are rare. In periods of relatively high unemployment, the number of persons seeking police employment may be greater than the number of openings. However, the written examinations and strict physical requirements always eliminate many applicants. The outlook should be good for persons having some college training in law enforcement.

Law enforcement is complex and requires an approach tailored to the particular problems of each city. The police department of a city with a large, mobile population is likely to emphasize traffic control, preventive patrol, and cooperation with police agencies in the surrounding areas. In smaller cities, or those with well-established communities and fewer employment and recreation centers, police work may be less specialized. In either case, however, the usual way of increasing police protection is to provide more officers for duty.

The number of officers employed will depend on the amount of money made available by local governments. Because police work is essential, it is likely that funding for law enforcement will have high priority, and that the employment of city police officers will rise faster than the average for other occupations through the mid-1980's.

Earnings and Working Conditions

In 1976, entry level salaries for police officers averaged nearly $11,300 a year, although they varied widely from city to city. In some smaller communities, officers started at less than $8,400 a year, while some major cities offered over $15,000 a year to new employees. Most officers receive regular salary increases during the first few years of employment until they reach a set maximum for their rank. Maximum earnings averaged $13,900 a year in 1976, and exceeded $17,000 a year in some areas.

Promotion to a higher rank brings a higher basic salary. The average starting salary for sergeants, for example, was almost $14,500 a year in 1976; more than $18,000 a year in the largest cities. Beginning salaries for lieutenants averaged more than $16,300 a year in 1976. In general, police officers are paid about 1 1/2 times as much as nonsupervisory workers in private industry, except farming.

Police departments usually provide officers with special allowances for uniforms and furnish revolvers, night sticks, handcuffs, and other required equipment.

The scheduled workweek for police officers usually is 40 hours. Because police protection must be provided around the clock in all but the smallest communities, some officers are on duty over weekends, on holidays, and at night. Police officers are subject to call any time their services are needed and may work overtime in emergencies. In some departments, overtime is paid at straight time or time and one-half; in others, officers may be given an equal amount of time off on another day of the week.

Police officers generally are covered by liberal pension plans, enabling many to retire at half pay by the time they reach age 55. In addition, paid vacations, sick leave, and health and life insurance plans frequently are provided.

Police officers may have to work outdoors for long periods in all kinds of weather. The injury rate is higher than in many occupations and reflects the risks officers take in pursuing speeding motorists, capturing lawbreakers, and dealing with public disorder.

Sources of Additional Information

Information about entrance requirements may be obtained from local civil service commissions or police departments.

Additional information describing careers as police officers is available from:

International Association of Chiefs of Police,
11 Firstfield Rd., Gaithersburg, Md. 20760.

POLITICAL SCIENTISTS

(D.O.T. 051.088)

Nature of the Work

Political scientists study the functions and workings of governments. Many of them specialize in a general area of political science including political theory, U.S. political institutions and processes, comparative political institutions and processes, or international relations and organizations. Some specialize in a particular type of political institution or in the politics of a specific era.

Most political scientists teach in colleges and universities where they may combine research, consultation, or administrative duties with teaching. Some are primarily researchers who survey public opinion on political questions for private research organizations, or study proposed legislation for Federal, State, and municipal governments, legislative reference bureaus, or congressional staffs and committees. Others analyze the operations of government agencies, specialize in foreign affairs, or do administrative or research work for either government or nongovernment organizations. Some political scientists serve as consultants to political groups or business firms.

Some political scientists survey public opinion on political questions for private research organizations.

Places of Employment

About 14,000 persons worked as political scientists in 1976, excluding those teaching in secondary schools. About four-fifths work in colleges and universities. Most of the remainder work in government, management consulting firms, political organizations, research organizations, civic and taxpayers associations, and large business firms.

Political scientists can be found in nearly every college or university town since courses in government and political science are taught in almost all institutions of higher education. Since the national headquarters of many associations, unions, and other organizations are located in Washington, D.C., this area attracts a sizable number of political scientists in research or policy jobs. The Federal Government employs political scientists both domestically and abroad. Those on overseas assignment work primarily for agencies of the U S. Department of State, such as the Foreign Service, and the U.S. Agency for International Development. Other employing agencies include the U.S. Information Agency, Energy Research and Development Agency, Central Intelligence Agency, and the Departments of Defense, Treasury, Justice, and Commerce. Political scientists in the Federal Government primarily are concerned with foreign affairs, international relations, and intelligence. Those employed in State and local government often are concerned with the administration of housing, economic development, transportation, environmental protection, and health programs. Political scientists in the business world may deal with marketing, personnel, advertising, public relations, banking, finance, and consumer affairs.

Training, Other Qualifications, and Advancement

Graduate training generally is required for employment as a political scientist. Completion of all the requirements for the Ph. D. degree is becoming the prerequisite for appointment to academic positions, and almost always is required for one to gain a professorship and tenure. The Ph. D. also is helpful for advancement in government, industry, and other nonacademic areas.

College graduates with a master's degree can qualify for various administrative and research positions in government, industry, and nonprofit research or civic organizations. A master's degree in international relations, foreign service, or area study (for example, Soviet Government) is helpful in obtaining positions in Federal Government agencies concerned with foreign affairs. Intelligence, foreign affairs, and international relations specialists in the Federal Government generally must have 24 semester hours in political science, history, economics, or related fields.

People with a bachelor's degree in political science may qualify as trainees in such areas as management, research, administration, sales, and law enforcement. Many students with bachelor's degrees in political science go on to study law, journalism, or some specialized or related branch of political science, such as public administration and international relations.

In 1976, about 1,100 colleges and universities offered a bachelor's degree in political science, around 270 had master's programs, and about 115 had doctoral programs. Many colleges and universities offer field training and internships that provide experience in government work or teaching.

Undergraduate programs in political science include courses in the principles of government and politics, State and local government, comparative studies, political theory, foreign policy, public administration and policy, political behavior, constitutional, administrative, and international law, and many other offerings. Other specialized political science courses and seminars deal with the problems of detente, politics of growth and technology, politics of health, legal status of women, political warfare in the age of nuclear destruction, and political culture and the psychological processes of death. A growing number of programs at both the undergraduate and graduate levels offer courses in quantitative and statistical methods, including the use of computers.

Graduate students may specialize in American politics, comparative politics, international politics, political behavior, political theory, public administration, urban affairs, public policy, and other areas. Doctoral candidates often must exhibit competence in one or more foreign languages and quantitative research techniques.

Persons planning careers as political scientists should like to work with details. They must be objective and able to work independently or as part of a team. Ability to express themselves clearly, orally and in writing, is important to political scientists.

Employment Outlook

Employment of political scientists is expected to increase more slowly than the average for all occupations through the mid-1980's. Most jobs openings will result from deaths, retirements, and other separations from the labor force. The largest area of employment will continue to be in college and university teaching.

The number of persons who graduate with advanced degrees in political science will greatly exceed available job openings through 1985. As a result, those with a Ph. D. face stiff competition for positions through the mid-1980's, although Ph. D.'s from prestigious universities are likely to have an advantage. Many Ph. D.'s are expected to accept part-time, temporary assignments as instructors with little or no hope of gaining tenure. Graduates trained in quantitative methods of research, American Government, public administration, or policy science should have an advantage for both academic and nonteaching positions. Those with knowledge of economic theory, transportation, health care delivery systems, and environmental questions may be in particular demand. Graduates seeking to enter the foreign service are expected to face very stiff competition. Master's degree holders will face very keen competition finding academic positions, but those with specialized training in areas such as policy science or public administration may find jobs in Federal, State and local government, research bureaus, political organizations, and business firms.

New graduates with the bachelor's degree are expected to find few opportunities for jobs as professional political scientists. However, many of these graduates are expected to accept positions as trainees in government, business, and industry. For those planning to continue their studies in law, foreign affairs, journalism, and related fields, political science provides an excellent background. Some new graduates who meet State certification requirements will be able to enter high school teaching.

Earnings

According to the 1975-76 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,000 a year; master's degree candidates in the social sciences, around $12,000.

According to an American Political Science Association Survey, the median beginning salaries for new faculty members during 1975-76 were $12,300 for Ph. D.s and $11,200 for those without a Ph. D. The median annual salaries of political scientists employed in educational institutions in 1975-76 were: $22,000 for full professors; $17,000 for associate professors; $13,500 for assistant professors; and $11,500 for lecturers and instructors. In general, salaries of experienced political scientists are higher than the average for all nonsupervisory workers in private industry, except farming.

The Civil Service Commission recognizes education and experience in certifying applicants for entry level positions in the Federal Government. In general, the entrance salary for those with a bachelor's degree was $9,303 or $11,523 a year in 1977, depending upon the applicant's academic record. Starting salaries for those with a master's degree were $14,097 a year, and for those with a Ph. D., $17,056. Intelligence, foreign affairs, and international relations specialists in the Federal Government averaged around $25,300 in 1977.

Some political scientists, particularly those in college teaching, supplement their income by teaching summer courses or consulting.

Sources of Additional Information

Additional information on careers, job openings, and schools offering various graduate programs in political science and related fields is available from:

American Political Science Association, 1527 New Hampshire Ave. NW., Washington, D.C. 20036.

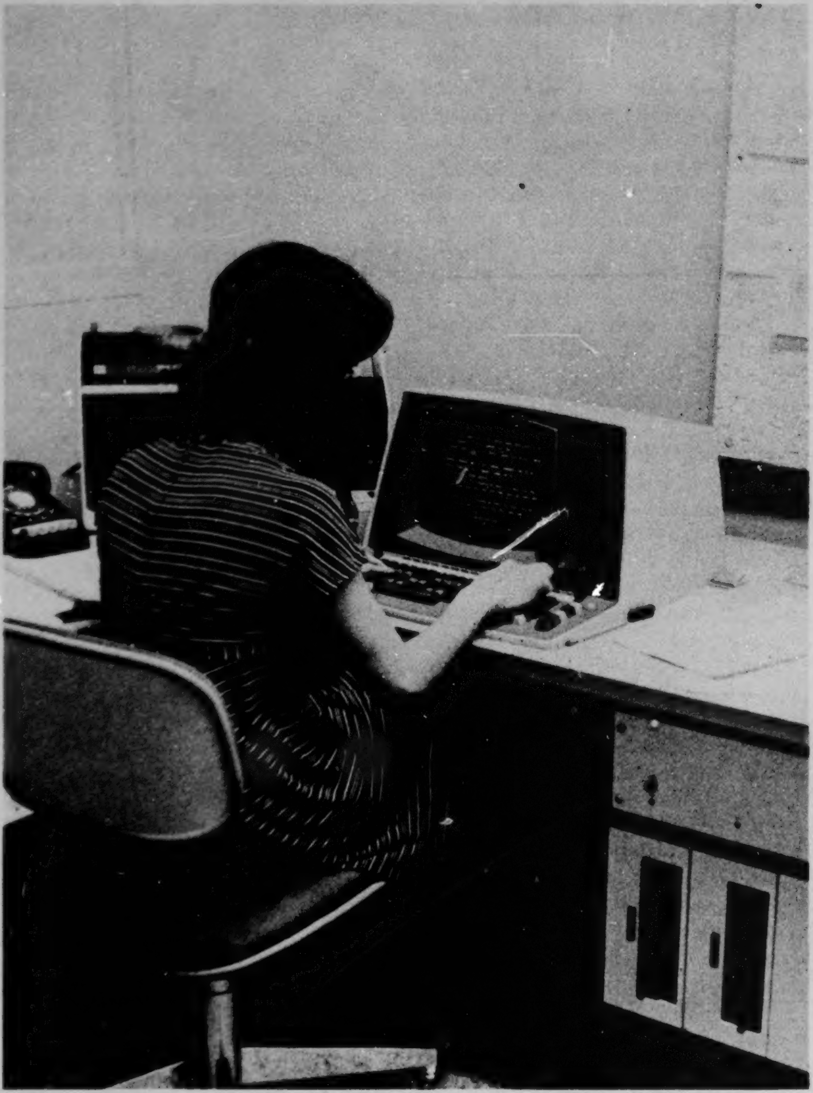
PROGRAMMERS

(D.O.T. 020.188)

Nature of the Work

Computers can process masses of information rapidly and accurately, but only if they are given step-by-step instructions to follow. Because the machines cannot think for themselves, computer programmers must write detailed instructions called programs that list in a logical order the steps the machine must follow to solve a problem.

Programmers usually work from problem descriptions prepared by systems analysts who have examined the problem and determined the steps necessary to achieve the desired results. (Systems analysts are described elsewhere in the *Handbook.*) In organizations that do not employ systems analysts, workers called programmer-analysts may be responsible for both systems analysis and programming. Once this analysis has been completed, a specialist called an applications programmer writes detailed instructions for processing the data, using one of the languages developed especially for computers.



Computer programmers write instructions that list the steps the computer must take to solve a problem.

Programs vary with the type of problem to be solved. For example, the mathematical calculations involved in payroll accounting procedures are different from those required to determine the flight path of a space probe. A business applications programmer developing instructions for billing customers would first decide what company records the computer would need and then draw a flow chart or diagram showing the steps the computer must follow to obtain old balances, add new charges, calculate finance charges, and deduct payments before determining a customer's bill. Using the flow chart, the programmer codes the actual instructions the computer will follow.

The programmer then checks the operation of the program to be sure the instructions are correct and will produce the desired information. This check is called "debugging." The programmer tries a sample of the data with the program and reviews the results to see if any errors are made. If errors occur, the program must be changed and rechecked until it produces the correct results.

Finally, an instruction sheet is prepared for the computer operator who will run the program. (The work of computer operators is described in the statement on Computer Operating Personnel.)

Although simple programs can be written in a few days, programs that use complex mathematical formulas or many data files may require more than a year of work. In such cases, several programmers may work together under an experienced programmer's supervision.

Applications programmers usually specialize in either business or scientific operations. A different type of specialist, the systems programmer, maintains the general instructions (called software) that control the operation of the entire computer system. These workers make changes in these sets of instructions that determine how the computer's resources are to be allotted among the various jobs it has been given. Because of their knowledge of operating systems, systems programmers often help applications programmers determine the source of problems with their programs.

Places of Employment

In 1976, about 230,000 persons worked as computer programmers. Most were employed by manufacturing firms, banks and insurance companies, data processing service organizations, and government agencies.

Programmers usually work in large firms that need and can afford extensive computer systems. Small firms generally require computers only for payroll or billing purposes and frequently pay data processing service organizations to do this work. Systems programmers usually work in research organizations, computer manufacturing firms, and large computer centers.

Training, Other Qualifications, and Advancement

There are no universal training requirements for progammers because employers' needs vary. Most programmers are college graduates; others have taken special courses in computer programming to supplement their experience in fields such as accounting or inventory control.

Employers using computers for scientific or engineering applications prefer college graduates with degrees in computer science, mathematics, engineering, or the physical sciences. Graduate degrees are required for some jobs. Very few scientific organizations are interested in applicants with no college training.

Although some employers who use computers for business applications do not require college degrees, they prefer applicants who have had college courses in data processing, accounting, and business administration. Occasionally, workers who are experienced in computer operation or payroll accounting but have no college training are promoted to programming jobs; however, they need additional data processing courses to become fully qualified programmers. Prior work experience is not essential for a job as a programmer; in fact, about half of all entrants to the occupation have no significant work experience.

Computer programming is taught at public and private vocational schools, colleges, and universities. Instruction ranges from introductory home study courses to advanced courses at the graduate level. High schools in many parts of the country also offer courses in computer programming.

In hiring programmers, employers look for people who can think logically and are capable of exacting analytical work. The job calls for patience, persistence, and the ability to work with extreme accuracy even under pressure. Ingenuity and imagination are particularly important when programmers must find new ways to solve a problem.

Beginning applications programmers usually spend their first weeks on the job attending training classes. After this initial instruction, they work on simple assignments while completing further specialized training programs. Programmers generally must spend at least several months working under close supervision before they can handle all aspects of their job. Because of rapidly changing technology, programmers must continue their training by taking courses offered by their employer and software vendors. For skilled workers, the prospects for further advancement are good. In large organizations, they may be promoted to lead programmers and be given supervisory responsibilties. Some applications programmers advance to systems programming. Both applications programmers and systems programmers often are promoted to the more demanding occupation of systems analyst.

Employment Outlook

Employment of programmers is expected to grow faster than the average for all occupations through the mid-1980's as computer usage expands, particularly in firms providing accounting and business management services and organizations involved in research and development. In addition to job openings resulting from growth of the occupation, several thousand openings will arise each year from the need to replace workers who leave the occupation. Because many programmers are relatively young, few openings will result from deaths or retirements. However, many vacancies will be created as experienced workers transfer into jobs as systems analysts.

The demand for applications programmers will increase as many processes once done by hand are automated, but employment will not grow as rapidly as in the past for several reasons. Improved software, such as utility programs that can be used by other than data processing personnel will simplify or eliminate some programming tasks. Also, employment of programmers in data processing firms is not expected to rise as fast as in recent years. Technology has reduced both the size and cost of computer hardware, bringing a computer system within reach of small businesses. As more small firms install their own computer, rather than rely on a data processing firm, employment growth in these data processing firms may slow somewhat. Demand throughout the economy, however, should remain strong over the next decade. Prospects should be brightest for college graduates who have had computer-related courses, particularly for those with a major in computer science or a related field. Graduates of 2-year programs in data processing technologies also should find ample opportunities, although generally limited to business applications.

Earnings and Working Conditions

Average weekly earnings of programmer trainees in private industry ranged from $190 to $200 in 1976, according to surveys conducted in urban areas by the Bureau of Labor Statistics and firms engaged in research on data processing occupations. Systems programmers generally earn more than applications programmers. For example, experienced systems programmers averaged about $360 a week compared to $310 for applications programmers. Average salaries for lead programmers were $385 and $355, respectively. In general, programmers earn about twice as much as average earnings of all nonsupervisory workers in private industry, except farming.

In the Federal Civil Service, the entrance salary for persons with a college degree was about $180 a week in 1977. Salaries for Federal Government programmers at all levels are generally comparable to those in private industry.

Programmers working in the North and West earned somewhat more than those working in the South. Those working for data processing services and public utilities had higher earnings than programmers employed in banks, advertising, or educational institutions.

Programmers work about 40 hours a week, but their hours are not always from 9 to 5. Once or twice a week a programmer may report early or work late to use the computer when it is available. Occasionally, they work on weekends or are telephoned to advise computer operators working a second or third shift.

Sources of Additional Information

Additional information about the occupation of programmer is available from:

American Federation of Information Processing Societies, 210 Summit Ave., Montvale, N.J. 07645.

Association for Computing Machinery, 1133 Avenue of the Americas, New York, N.Y. 10036.

PSYCHOLOGISTS

(D.O.T. 045.088 and .108)

Nature of the Work

Psychologists study the behavior of individuals and groups in order to understand and explain their actions. During their work, they may be concerned with the effect of one member's emotional stress upon a family, causes of low morale at work, or the most effective way of dealing with terrorists. Some engage in teaching, research, and administrative activities in colleges and universities; others provide counseling services, plan and conduct training programs for employees, conduct research, advise on psychological methods and theories, or administer psychology programs in hospitals, clinics, or research laboratories. Many psychologists combine several of these activities.

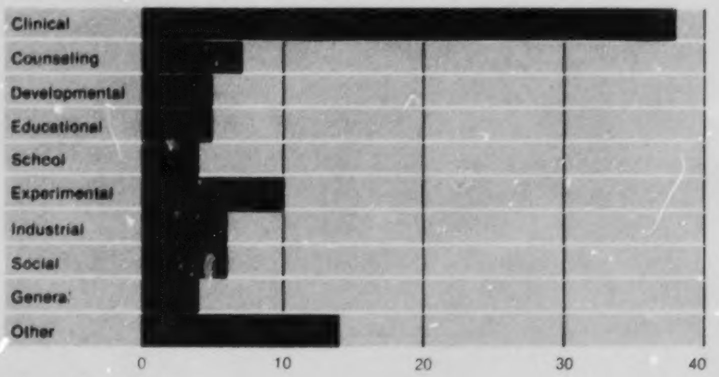
Psychologists gather information about the capacities, interests, and behavior of people in various ways. They interview individuals, develop and administer tests and rating scales, study personal histories, and conduct controlled experiments. Also, psychologists often design and conduct surveys.

Psychologists specialize in a wide variety of areas. *Experimental psychologists* study behavior processes and work with human beings and lower animals such as rats, monkeys, and pigeons; prominent areas of experimental research include motivation, learning and retention, sensory and perceptual processes, and genetic and neurological factors in behavior. *Developmental psychologists* study the patterns and causes of behavioral change as people progress through life; some concern themselves with the origins of human behavior during childhood, while others study changes that take place during maturity and old age. *Personality psychologists* study human nature, individual differences, and the ways in which those differences develop. *Social psychologists* examine people's interactions with others and with the social environment; prominent areas of study include group behavior, leadership, and dependency relationships. Psychologists in *evaluation research* study social programs and their effects and recommend improvements as a result of increased understanding. *Environmental psychologists* study the influences of environments on people, and their perceptions of these environments. *Population psychologists* study demography's relation to personal and social behavior. *Comparative psychologists* compare the behavior of different animals, including man. *Physiological psychologists* study the relationship of behavior to the biological functions of the body. Psychologists in the field of *psychometrics* develop and apply procedures for measuring psychological variables.

Psychologists often combine several areas in their specialty. *Clinical psychologists*, the largest specialty, generally work in mental hospitals or clinics, or maintain their own practices. They may help the mentally or emotionally disturbed readjust to life with altered physical capabilities. They interview patients, give diagnostic tests, provide individual, family, and group psychotherapy, and design and carry through behavior modification programs. *Counseling psychologists* use several techniques, including interviewing and testing, to help people with problems of everyday living—personal, social, educational, or vocational. *Educational psychologists* study psychological processes as related to applied problems in education. *School psychologists* diagnose educational problems, facilitate school adjustment, and help solve learning and social problems in

Among doctoral psychologists, clinical specialists make up the largest group

Specialties in psychology, percent of employment, 1975



Source: National Research Council

the schools. *Industrial and organizational psychologists* engage in personnel research, policy, and planning, training and development, psychological test research, counseling, and organizational development and analysis, among other activities. *Engineering psychologists* develop and improve human-machine systems, military equipment, and industrial products. *Community psychologists* apply psychological knowledge to problems of community life. *Consumer psychologists* study the psychological factors that determine an individual's behavior as a consumer of goods and services.

Places of Employment

About 90,000 people, excluding secondary school teachers, worked as psychologists in 1976. About one-half worked in educational institutions, primarily colleges and universities (including medical schools), either as teachers, researchers, administrators, or counselors.

The second largest group of psychologists work in hospitals, clinics, rehabilitation centers, and other health facilities, while many others work for Federal, State, or local government agencies. They typically administer and interpret intelligence, interest, and aptitude tests; diagnose and treat mental disorders; and conduct educational, vocational, and personal adjustment counseling. Federal agencies that employ the most psychologists are the Veterans Administration, the Department of Defense, and the Public Health Service. Other employing agencies include the Departments of Justice, Commerce, Treasury, Interior, Labor, and Transportation, the Civil Service Commission, the National Aeronautical and Space Administration, and the Environmental Protection Agency.

Psychologists also are employed in correctional institutions, research organizations, and business firms. Some are in independent practice or work as consultants.

Training, Other Qualifications, and Advancement

A doctoral degree almost always is the minimum requirement for employment as a psychologist. The degree is needed for many entrance positions and is becoming increasingly important for advancement. People with doctorates in psychology qualify for the more responsible research, clinical, and counseling positions, as well as for teaching positions in colleges and universities and administrative posts in Federal and State programs. The doctoral degree is necessary to gain academic tenure, a process that is becoming more difficult and taking longer than in the past.

People with a master's degree in psychology can qualify as psychological assistants, administering and interpreting some kinds of psychological tests. Working under the supervision of psychologists, they may collect and analyze data, conduct experiments, or perform administrative duties. They also qualify for certain counseling jobs or—if they have previous teaching experience—may be hired as school psychologists or counselors. (See the statements on school counselors and rehabilitation counselors.)

People with a bachelor's degree in psychology may work directly under psychologists and other professionals in community mental health centers, vocational rehabilitation offices, and correctional programs; as research or administrative assistants; as trainees in government or business; or—provided they meet State certification requirements—as high school teachers.

In the Federal Government, some positions are filled at the entrance grade with candidates having at least 24 semester hours in psychology and one course in statistics. Most positions, however, are filled at a higher grade. Clinical psychologists generally must have completed the Ph. D. requirements and have served an internship; counseling psychologists need 2 years of graduate study in counseling and 1 year of counseling experience.

At least 1 year of full-time graduate study is needed to earn a master's degree in psychology. An additional 3 to 5 years of graduate work usually are required for a Ph. D. In clinical or counseling psychology, the requirements for the Ph. D. degree generally include an additional year or more of internship or supervised experience. Doctoral candidates at some universities must exhibit competence in a foreign language. Some gain postdoctoral appointments for special study and research.

The Ph. D. degree culminates in a dissertation based on original research which contributes to psychological knowledge. Another professional degree, the Psy. D. (Doctor of Psychology), is based on practical work and examinations rather than a dissertation.

Some universities require graduate school applicants in psychology to have a major in that field. Others prefer only basic psychology with courses in the biological, physical, and social sciences, statistics, and mathematics. Some persons trained in other fields such as social work, counseling, and education find graduate education in psychology useful.

Competition for admission into graduate psychology programs is keen. Only the most highly qualified applicants can expect to be admitted to graduate study.

Over 1,100 colleges and universities offer a bachelor's degree program in psychology; about 325, a master's; about 165, a Ph. D.; and about 20, a Psy. D. The American Psychological Association (APA) presently accredits doctoral training programs in clinical, counseling, and school psychology. In 1976, over 100 colleges and universities offered fully approved programs in clinical psychology; over 20, in counseling psychology; and fewer than 10, in school psychology. APA also has approved about 120 facilities offering internships for doctoral training in clinical and counseling psychology.

Although financial aid is becoming increasingly difficult to obtain, some graduate students may receive fellowships, scholarships, or part-time employment. The Veterans Administration offers a number of predoctoral traineeships to students while they work as interns in VA hospitals, clinics, and related training agencies. The National Science Foundation, Department of Health, Education, and Welfare, various branches of the Armed Forces, and many other organizations and foundations also provide fellowships, grants, and loans. However, the present trend at the Federal level is to provide low-interest loans rather than fellowships and grants.

Psychologists who want to enter independent practice must meet certification or licensing requirements. In 1976, 49 States and the District of Columbia had these requirements. Licensing laws vary by State, but generally require a doctorate in psychology, 2 years of professional experience, and an examination.

Sensitivity, patience, and a genuine interest in others are particularly important for work in clinical and counseling psychology.

The American Board of Professional Psychology awards diplomas in clinical, counseling, industrial and organizational, and school psychology. Candidates generally need a doctorate in psychology, 5 years of qualifying experience, and professional endorsements, and also must pass an examination.

People pursuing a career in psychology must be emotionally stable, mature, and able to deal effectively with people. Sensitivity, patience, and a genuine interest in others are particularly important for work in clincal and counseling psychology. Research psychologists should be able to do detailed and independent work; verbal and writing skills are necessary to communicate research findings.

Employment Outlook

Employment of psychologists is expected to grow faster than the average for all occupations through the mid-1980's. In addition to employment growth, some openings will result from deaths, retirements, and other separations from the labor force.

Several factors should help maintain a strong demand for psychologists. First is increased public concern for the development of human resources, particularly among the aging and minority groups. Growing awareness of the need for testing and counseling children also should increase the demand. Federal legislation emphasizing good health rather than treatment of illness may produce new roles for psychologists in preventive and therapeutic situations and in group practice. Inclusion of psychological services in a future national health insurance program also may heighten demand.

Other openings are likely to occur as psychologists move into new fields such as technology assessment—the study of the effects of technological advances in areas such as agriculture, energy, the environment, and the conservation and use of natural resources. In addition, psychologists are becoming involved in program evaluation in such fields as education, military service, and law enforcement. Government agencies, business, and industry also are making increased use of the services that psychologists can provide in counseling, employee assessment and training, and market research.

A doctorate is increasingly necessary for those wishing to enter the field. However, the growing number of doctoral degrees awarded in psychology each year means that new Ph. D.'s will face increasing competition for jobs through 1985, particularly academic positions in large colleges and universities. Those willing to work in smaller and newer institutions should have better employment prospects.

Persons holding doctoral degrees from prestigious universities should have an advantage on the job market. Those with doctorates in applied areas such as clincial, counseling, and industrial or organizational psychology are expected to have more favorable job prospects than those trained in traditional academic specialties such as experimental, physiological, and comparative psychology.

As more and more people earn doctorates in psychology, master's degree holders will face increasingly keen competition, particularly for research or teaching jobs in colleges and universities. Opportunities are likely to be best in industry, government, and human service organizations, all of which will have some jobs for persons with training in applied areas including evaluation research.

Bachelor's degree holders will be able to enter the field only as assistants or trainees, working under the direct supervision of psychologists and other professionals. However, for persons who wish to continue their education in fields such as law, medicine, social work, sociology, counseling, recreation, gerontology, or related disciplines, psychology provides an excellent undergraduate background.

Earnings and Working Conditions

In 1975, the median starting salary for psychologists holding a master's degree was about $11,000 a year, according to the American Psychological Association. The median beginning salary for those holding a doctorate was about $13,000 for 9-month academic jobs and between $16,000 and $17,000 for 12-month jobs.

According to a 1975 survey by the National Research Council, the median annual salary for all doctoral psychologists was about $22,000. In educational institutions, the median was about $20,900; in the Federal Government, about $26,600; in State and local government, about $21,500; in hospitals and clincs, about $21,400; in nonprofit organizations, about $24,600; and in business and industry, about $30,600. Ph. D. psychologists in private practice and in applied specialties generally have higher earnings than other psychologists. In general, salaries of experienced psychologists are much higher than the average for all nonsupervisory workers in private industry, except farming.

The Civil Service Commission recognizes education and experience in certifying applicants for entry level positions in the Federal Government. In general, the entrance salary for psychologists having a bachelor's degree was $9,303 or $11,523 a year in 1977; counseling psychologists with a master's degree and 1 year of counseling experience started at $14,097; clinical psychologists having a Ph. D. degree and 1 year of internship started at $17,056. The average salary for psychologists in the Federal Government was about $25,200 a year in 1977.

Psychologists in colleges and universities receive the same benefits as other faculty members—sabbatical leaves of absence, life and health insurance, and retirement benefits. Working hours are generally flexible, but often entail evening work with individual students or groups. Clinical and counseling psychologists often work in the evenings since their patients sometimes are unable to leave their jobs or school during the day.

Sources of Additional Information

For information on career opportunities and job openings for psychologists, admission and degree requirements in colleges and universities offering graduate programs in psychology, accreditation, certification or licensure requirements, and financial assistance for graduate students in psychology, contact:

American Psychological Association, Educational Affairs Office, 1200 17th St. NW., Washington, D.C. 20036.

Information on traineeships and fellowships is available from colleges and universities that have graduate psychology departments.

PUBLIC RELATIONS WORKERS

(D.O.T 165.068)

Nature of the Work

Public relations workers apply their talent for communication in many different areas. They may handle press, community, or consumer relations, sales promotion, political campaigning, interest-group representation, fund raising, or employee recruitment. The role they play is crucial to improved understanding and cooperation among the diverse individuals, groups, organizations, and institutions that make up our society.

How successfully an organization presents goals and policies may affect its public acceptance, prosperity, and even its continued existence. Public relations workers help organizations build and maintain positive public reputations. Public relations is more than telling the employer's "story," however. Understanding the attitudes and concerns of customers, employees, and various other "publics"—and communicating this information to management—is an important part of the job.

22

Public relations workers help organizations build and maintain a positive public image.

Public relations departments are found in organizations of all kinds, and workers must tailor their programs to an employer's particular needs. A public relations director for a college or university, for example, may devote most of his or her energies to attracting additional students, while one in a large corporation may handle the employer's relations with stockholders, government agencies, and community groups.

Public relations workers put together information that keeps the public aware of their employer's activities and accomplishments and keeps management aware of public attitudes. After preparing the information, they may contact people in the media who might be interested in publicizing their material. Many radio or television public service announcements or special reports, newspaper items, and magazine articles start at public relations workers' desks. Sometimes the subject is a company and its policies towards its employees or its role in the community. Often the subject is a public issue, such as health, nutrition, energy, or the environment.

Public relations workers also arrange and conduct programs in which company representatives will have direct contact with the public. Such work includes setting up speaking engagements for company officials and writing speeches for them. These workers often serve as an employer's representative during community projects or occasionally may show films at school assemblies, plan conventions, or manage fund-raising campaigns.

Public relations staffs in very large firms may number 200 or more, but in most firms the staff is much smaller. The director of public relations, who is often a vice president, may develop overall plans and policies with a top management executive. In addition, large public relations departments employ writers, research workers, and other specialists who prepare material for the different media, stockholders, and other publics.

Workers who handle publicity for an individual or direct public relations for a university or small business may handle all aspects of the job. They make contacts with people outside the organization, do the necessary planning and research, and prepare material for publication. These workers may combine public relations duties with advertising or sales promotion work; some are top-level officials and others have lower level positions. The most skilled public relations work of making overall plans and maintaining contacts usually is done by the department director and highly experienced staff members.

Places of Employment

About 115,000 persons were public relations workers in 1976. Manufacturing firms, public utilities and transportation companies, insurance companies, and trade and professional associations employ many public relations workers. A sizable number work for government agencies (the Federal Government alone employs several thousand public information specialists), or for schools, colleges, museums, and other educational, religious, and human service organizations. The rapidly expanding health field also offers opportunities for public relations work, in hospitals, pharmaceutical companies, and medical associations, for example. A number of public relations workers are employed by public relations consulting firms which furnish public relations services to clients for a fee. Some work for advertising agencies.

Public relations workers are concentrated in large cities where press services and other communications facilities are readily available, and where many businesses and trade associations have their headquarters. More than half of the estimated 2,000 public relations consulting firms in the United States are in New York, Los Angeles, Chicago, and Washington, D.C. A major trend, however, is the dispersal of public relations jobs throughout the Nation, including smaller towns.

Training, Other Qualifications, and Advancement

A college education combined with public relations experience is an excellent preparation for public relations work. Although most beginners have a college degree in journalism, communications, or public relations, some employers prefer a background in a field related to the firm's business—science, finance, or engineering, for example. Some firms want college graduates with experience working for the news media. In fact, many editors, reporters, and workers in closely related fields enter public relations work.

In 1976, about 90 colleges and more than 30 graduate schools offered degree programs or special curriculums in public relations, usually administered by the journalism or communications department. In addition, about 200 colleges offered at least one course in this field. Courses include public relations theory and techniques, organizational communication, public relations management and administration, practical courses in public relations, and others. Specialties are offered in public relations in business, government, and nonprofit organizations. Persons with a bachelor's degree in public relations or a related field generally enter staff positions whereas those with a graduate degree are more qualified for administrative and managerial jobs.

Public relations workers must have considerable ability to gather information, write, speak, and deal effectively with people. Courses in journalism, business administration, psychology, sociology, political science, advertising, English, and public speaking help in preparing for a public relations career. Extracurricular activities such as writing for a school publication or television or radio station provide valuable experience. Many schools help students gain part-time or summer internships in public relations which provide training that can help in competing for entry positions. Membership in the Public Relations Student Society of America provides an opportunity for students to exchange views with public relations practitioners and to make professional contacts that may be helpful in later securing a job in the field. A portfolio of published articles, television or radio programs, slide presentations, and other work samples usually is an asset in finding a job.

Creativity, initiative, and the ability to express thoughts clearly and simply are important to the public relations worker. Fresh ideas are so vital in public relations that some experts spend all their time developing new ideas, leaving the job of carrying out programs to others.

People who choose public relations as a career need an outgoing personality, self-confidence, and an understanding of human psychology. They should have the enthusiasm necessary to motivate people. Public relations workers need a highly developed sense of competitiveness and the ability to function as part of a team.

Public information specialist positions in the Federal Government generally require a college degree. Media, writing, or editing experience may be quite helpful in gaining such a position. Requirements for similar positions in State and local governments vary.

Some companies—particularly those with large public relations staffs—have formal training programs for new workers. In other firms, new employees learn by working under the guidance of experienced staff members. Beginners often maintain files of material about company activities, scan newspapers and magazines for appropriate articles to clip, and assemble information for speeches and pamphlets. After gaining experience, they work on more difficult assignments, such as writing press releases, speeches, and articles for publication. In some firms, workers get all-round experience whereas in other firms, public relations workers tend to specialize.

Promotion to supervisory jobs may come as workers show they can handle more demanding and creative assignments. Some experienced public relations workers start their own consulting firms.

The Public Relations Society of America accredits public relations workers who have at least 5 years' experience in the field and have passed a comprehensive 6-hour examination (4 hours written, 2 hours oral). However, because of disagreements over the appropriateness of formal licensing requirements in this field, such requirements are not expected in the immediate future.

Employment Outlook

Employment of public relations workers is expected to increase faster than the average for all occupations through the mid-1980's. In addition to new jobs created by this growth, openings will occur every year because of the need to replace workers who die, retire, or leave the field for other reasons.

Demand for public relations workers may be affected by economic conditions, slackening as employers delay expansion or impose staff cuts during business slowdowns. Over the long run, however, expenditures on public relations are expected to increase substantially. Corporations, associations, and other large organizations are likely to expand their public relations efforts to gain public support and approval.

Competition for beginning jobs is keen, for public relations work has an aura of glamour and excitement that attracts large numbers of jobseekers. Furthermore, the number of people who transfer into public relations from newspaper, advertising, or other closely related jobs is expected to exceed the number transferring out. This factor should serve to stiffen competition.

Prospects for a career in public relations are best for highly qualified applicants—talented people with sound academic preparation and some media experience. Most openings are expected to occur in large organizations—corporations, public relations consulting firms, manufacturing firms, educational institutions, and others.

Earnings and Working Conditions

Starting salaries for college graduates beginning in public relations work generally ranged from $7,500 to $10,000 a year in 1976; persons with a graduate degree generally started at a higher salary.

The salaries of experienced workers generally are highest in large organizations with extensive public relations programs. According to a 1976 survey, median annual salaries of public relations workers were as follows: Presidents of public relations consulting firms, $38,000; public information or relations directors and managers in the Federal Government, $23,500; in State government, $17,000; in local government, $22,000; in educational organizations, $23,500. According to a 1975 survey of a wide range of firms, public relations executives averaged $29,000-49,000 a year, while public relations managers averaged $21,000-31,000 a year, depending on the annual sales volume of the firm. Many firms offered incentive compensation. Based on a 1975 survey of advertising agencies, public relations directors averaged $20,100 a year, while public relations account executives averaged $15,100.

Public relations consulting firms often pay higher salaries than organizations with their own public relations departments. Salaries in manufacturing firms are among the highest while salaries in social welfare agencies, nonprofit organizations, hospitals, and universities are among the lowest.

In the Federal Government, bachelor's degree holders generally started at $9,303 or $11,523 a year in 1977, depending upon the applicant's academic record; master's degree holders generally started at $14,097 a year; additional education or experience could qualify applicants for a higher salary. Public information specialists averaged about $24,300 a year in 1977.

Although the workweek for public relations staffs usually is 35 to 40 hours, overtime often is necessary to prepare or deliver speeches, attend meetings and community activities, or travel out of town. Occasionally, the nature of their regular assignments or special events requires public relations workers to be on call around the clock.

Sources of Additional Information

For career information and a list of schools offering degrees and courses in the field, write to:

Career Information, Public Relations Society of America, Inc., 845 Third Ave., New York, N.Y. 10022.

Current information on the public relations field, salaries, and other items is available from:

PR Reporter, Dudley House, P.O. Box 600, Exeter, N.H. 03833.

For additional information on job opportunities and the public relations field in general, write to:

Service Department, *Public Relations News*, 127 East 80th St., New York, N.Y. 10021.

PURCHASING AGENTS

(D.O.T. 162.158)

Nature of the Work

If materials, supplies, or equipment are not on hand when needed, an organization's work may be interrupted or halted. Maintaining an adequate supply of items an organization needs to operate is the purchasing agent's job.

Purchasing agents, also called industrial buyers, obtain goods and services of the required quality at the lowest possible cost, and see that adequate supplies are available. Agents who work for manufacturing firms buy machinery, raw materials, product components, and services; those working for government agencies may purchase office supplies, furniture, and business machines. Information on retail buyers, who purchase merchandise for resale in its original form, is presented in the statement on buyers elsewhere in the *Handbook*.

Purchasing agents buy when stocks on hand reach a predetermined reorder point, or when a department in the organization requisitions items it needs. Because agents often can purchase from many sources, their main job is selecting the seller who offers the best value.

Purchasing agents use a variety of means to select among suppliers. They compare listings in catalogs and trade journals and telephone suppliers to get information. They also meet with salespersons to examine samples, watch demonstrations of equipment, and discuss items to be purchased. Frequently agents invite suppliers to bid on large orders; then they select the lowest bidder among those who meet requirements for quality of goods and delivery date.

In some cases, however, purchasing agents must deal directly with a manufacturer to obtain specially designed items made exclusively for their organization. These agents must have a high degree of technical expertise to insure that all product specifications are met.

It is important that purchasing agents develop good business relations with their suppliers. This can result in savings on purchases, favorable terms of payment, and quick delivery on rush orders or materials in short supply. They also work closely with personnel in various departments of their own organization. For example, they may discuss product design with company engineers or shipment problems with workers in the traffic department.

Once an order has been placed with a supplier, the purchasing agent makes periodic checks to insure that it will be delivered on time. This is necessary to prevent work flow interruptions due to lack of materials. After an order has been received and inspected, the purchasing agent authorizes payment to the shipper.

Because of its importance, purchasing usually is designated as a separate responsibility within an organization. In a large firm or government agency, purchasing agents usually specialize in one or more specific items—for example, steel, lumber, cotton, or petroleum products. The agents are divided into sections, headed by assistant purchasing managers, that are responsible for a group of related commodities. In smaller organizations, agents generally are assigned certain categories of goods, such as all raw materials or all office supplies, furniture, and business machines.

Purchasing agents must develop good business relations with their suppliers.

Places of Employment

About 190,000 persons worked as purchasing agents in 1976. Over half worked in manufacturing industries. Large numbers also were employed by government agencies, construction companies, hospitals, and schools.

About half of all purchasing agents work in organizations that have fewer than five employees in the purchasing department. Many large business firms and government agencies, however, have much larger purchasing departments; some employ as many as 100 specialized buyers or more.

Training, Other Qualifications, and Advancement

Although there are no universal educational requirements for entry level jobs, most large companies now require a college degree, and prefer applicants with a master's degree in business administration. Training requirements vary with the needs of the firm. For example, companies that manufacture complex machinery or chemicals may prefer applicants with a background in engineering or science, while other companies hire business administration or liberal arts majors for trainee jobs. Courses in purchasing, accounting, economics, and statistics are very helpful. Familiarity with the computer and its uses also is desirable.

Small companies generally have less rigid educational requirements because they often purchase less complex goods in much smaller quantities. Some require a bachelor's degree; many others, however, hire graduates of associate degree programs in purchasing for entry level jobs. Promotion of clerical workers or technicians into purchasing jobs is much more common in small firms. Regardless of size of company, a college degree is becoming increasingly important for advancement to management positions.

The purchasing agent must be able to analyze numbers and technical data in order to make buying decisions and take responsibility for spending large amounts of money. The job requires the ability to work independently and a good memory for details. In addition, a purchasing agent must be tactful in dealing with salespersons and able to motivate others.

Regardless of their educational background, beginning purchasing agents initially spend considerable time learning about company operations and purchasing procedures. They may be assigned to the storekeeper's section to learn about the purchasing system, inventory records, and storage facilities. Next they may work with experienced buyers to learn about types of goods purchased, prices, and suppliers.

Following the initial training period, junior purchasing agents are given the responsibility for purchasing standard and catalog items. As they gain experience and develop expertise in their assigned areas, they may be promoted to purchasing agent, then senior purchasing agent. Workers with proven ability can move into a job as assistant purchasing manager in charge of a group of purchasing agents and then advance to manager of the entire purchasing department. Many purchasing managers move into executive positions as director of purchasing or director of materials management.

Continuing education is essential for purchasing agents who want to advance in their careers. Purchasing agents are encouraged to participate in frequent seminars offered by professional societies and to take courses in purchasing at local colleges and universities. The recognized mark of experience and professional competence in private industry is the designation Certified Purchasing Manager (CPM). This designation is conferred by the National Association of Purchasing Management, Inc., upon candidates who have passed four examinations and who meet educational and experience requirements. In government agencies, the indication of professional competence is the designation Certified Public Purchasing Officer (CPPO), which is conferred by the National Institute of Governmental Purchasing, Inc. The CPPO is earned by passing two examinations and meeting educational and experience requirements.

Employment Outlook

Employment of purchasing agents is expected to increase faster than the average for all occupations through the mid-1980's. Several thousand jobs will be open every year due to growth of the occupation and the need to replace those who die, retire, or transfer to other work.

Opportunities will be excellent for persons with a master's degree in business administration. Persons with a bachelor's degree in engineering, science, or business administration whose college program included one course or more in purchasing also should have bright prospects. Graduates of 2-year programs in purchasing should continue to find ample opportunities, although they will probably be limited to small firms.

Demand for purchasing agents is expected to rise as their importance in reducing costs is increasingly recognized. In large industrial organizations, the purchasing department will be expanded in order to handle the growing complexity of manufacturing processes. In companies that manufacture complex items such as industrial engines and turbines, electronic computer equipment, and communications equipment, there will be a growing need for persons with a technical background to select highly technical goods.

Many opportunities also should occur in firms providing personal, business, and professional services. Strong growth is expected for this sector of the economy, and a growing number of hospitals, school districts, and other relatively small employers are recognizing the importance of professional purchasers in reducing their operating costs.

Earnings and Working Conditions

College graduates hired as junior purchasing agents in large firms earned about $11,700 a year in 1976, according to surveys conducted by the Bureau of Labor Statistics and Purchasing Magazine. Experienced agents purchasing standard items averaged about $14,200 a year; senior purchasing agents specializing in complex or technical goods averaged about $17,000. Assistant purchasing managers received average salaries of about $20,000 a year, while managers of a purchasing department received about $24,700. Many corporate directors of purchasing or materials management earned well over $50,000 a year. Salaries generally are higher in large firms where responsibilities often are greater. In 1976, earnings of purchasing agents were about 1 1/2 times as much as the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, beginning purchasing agents who had college degrees earned $9,300 or $11,500 in 1977, depending on scholastic achievement and relevant work experience. The average salary for all purchasing agents in the Federal Service was $20,500. Salary levels vary widely among State governments; however, average earnings range from $10,600 to $13,900 for purchasers of standard items, $14,200 to $18,800 for senior buyers purchasing highly complex items, and $21,000 to $26,000 for State purchasing directors.

Sources of Additional Information

Further information about a career in purchasing is available from:

National Association of Purchasing Management, Inc., 11 Park Place, New York, N.Y. 10007.

National Institute of Governmental Purchasing, Inc., 1001 Connecticut Ave. NW., Washington, D.C. 20036.

RADIO AND TELEVISION ANNOUNCERS

(D.O.T 159.148)

Nature of the Work

Most radio announcers act as disc jockeys, introducing recorded music, presenting news and commercials, and commenting on other matters of interest to the audience. They may "ad-lib" much of the commentary, working without a detailed script. They also may operate the control board, sell time for commercials, and write commercial and news copy. In large stations, however, other workers handle these jobs. (See the statement on occupations in the radio and television broadcasting industry elsewhere in the *Handbook*.)

Announcers employed by television stations and large radio stations usually specialize in particular kinds of announcing such as sports, news, or weather. They must be thoroughly familiar with their particular area. If a written script is needed for parts of the program, the announcer may do the research and writing. Announcers frequently participate in community activities. A sportscaster, for example, might be the master of ceremonies at a touchdown club banquet or greet customers at the opening of a new sporting goods store. Some announcers become well-known and highly paid personalities.

Places of Employment

About 26,000 announcers were employed by radio and television broadcasting stations in 1976. The average commercial radio or television station employs four to six announcers, although larger stations employ 10 or more. In addition to staff announcers, several thousand freelance announcers sell their services for individual assignments to networks and stations, or to advertising agencies and other independent producers.

Training, Other Qualifications, and Advancement

Announcers must have a pleasant and well-controlled voice, a good sense of timing, and excellent pronunciation. Correct English usage and a knowledge of dramatics, sports, music, and current events improve chances for success. The most successful announcers have a combination of personality and a knack for dramatization that makes them attractive to audiences.

High school courses in English, public speaking, dramatics, foreign languages, and electronics, plus sports and music hobbies, are valuable background for prospective announcers. A college liberal arts education provides an excellent background for an announcer, and many universities offer courses of study in the broadcasting field. Students at these institutions also may gain valuable experience by supplementing their courses with part-time work at the campus radio station and summer work at local stations, filling in for vacationing staff members. A

Announcers usually specialize in a particular area such as news, sports, or weather.

number of private broadcasting schools offer training in announcing.

Persons considering enrolling in any school, whether public or private, that offers training for a broadcasting career should contact the personnel managers of stations, broadcasting trade organizations, and the Better Business Bureau in their area to determine the school's performance in producing suitably trained candidates.

Most announcers get their first broadcasting jobs in small stations. Because announcers in small radio stations sometimes operate transmitters, prospective announcers often obtain an FCC Radiotelephone Third Class Operator License which enables them to operate a radio transmitter and, therefore, makes them much more useful to these stations.

Announcers usually work in several different stations in the course of their careers. After acquiring experience at a station in a small community, an ambitious and talented announcer may move to a better paying job in a large city. An announcer also may advance by getting a regular program as a disc jockey, sportscaster, or other specialist. In the national networks, competition for jobs is intense, and announcers usually must be college graduates and have several years of successful announcing experience before they are given an audition.

Employment Outlook

Competition for beginning jobs as announcers will be keen through the mid-1980's. The great attraction of the broadcasting field, plus its relatively small size, will continue to mean many more jobseekers than jobs. Over the next decade, it will be easier to get jobs in radio than in television because more radio stations hire beginners. These jobs generally will be located in small stations, and the pay will be relatively low.

Employment of announcers is expected to increase faster than the average for all occupations through the mid-1980's as new radio and television stations are licensed. Some jobs will become available as more cable television stations begin their own programming. Employment of announcers will not keep pace with the increase in the number of stations, however, because of the increased use of automatic programming equipment. Many jobs in this relatively small occupation will result from the need to replace experienced announcers who transfer to other occupations, retire, or die.

Earnings and Working Conditions

Salaries of beginning announcers in commercial television ranged from about $185 to $230 a week in 1976, and those of experienced announcers ranged from about $300 to $500, according to the limited information available. Many well-known announcers earn much more. As a rule, salaries increase with the size of the community and the station, and salaries in television are higher than those in radio. Announcers employed by educational broadcasting stations generally earn less than those who work for commercial stations.

Most announcers in large stations work a 40-hour week and receive overtime pay for work beyond 40 hours. In small stations, many announcers work 4 to 12 hours of overtime each week. Working hours consist of both time on the air and time spent in preparing for broadcasts. Evening, night, weekend, and holiday duty occurs frequently since many stations broadcast 24 hours a day, 7 days a week.

Working conditions are usually pleasant because of the variety of work and the many personal contacts that are part of the job. Announcers also receive some satisfaction from becoming well known in the area their station serves.

Sources of Additional Information

For general career information, write to:

National Association of Broadcasters, 1771 N St. NW., Washington, D.C. 20036.

Corporation for Public Broadcasting, 1111 16th St. NW., Washington, D.C. 20036.

For information on how to obtain an FCC license, write to:

Federal Communications Commission, Washington, D.C, 20554.

RANGE MANAGERS

(D.O.T. 040.081)

Nature of Work

Rangelands cover more than 1 billion acres of the United States, mostly in the Western States and Alaska. They contain many natural resources: grass and shrubs for animal graz-

Range managers may spend considerable time away from home working outdoors in remote parts of the range.

ing, habitats for livestock and wildlife, water from vast watersheds, facilities for water sports and other kinds of recreation, and valuable mineral and energy resources. Rangelands also serve as areas for scientific study of the environment.

Range managers, sometimes called *range scientists*, *range ecologists*, or *range conservationists*, manage, improve, and protect range resources to maximize their use without incurring ecological destruction. For example, range managers determine the number and kind of animals to be grazed, the grazing system to be used, and the best season for grazing in order to yield a high production of livestock. At the same time, they must conserve soil and vegetation for other uses such as wildlife habitat, outdoor recreation, and timber production.

Range managers restore and improve rangelands through techniques such as controlled burning, reseeding, and biological, chemical, or mechanical control of undesirable plants. For example, selected rangelands with natural sagebrush vegetation may be plowed and reseeded with a more productive grass. Range managers also determine the need for and carry out range conservation and development such as providing for animal watering facilities, erosion control, and fire prevention.

Not all of the range manager's time is spent outdoors. Office work is not unusual. The range manager may consult with other conservation specialists, prepare written reports, and perform certain administrative duties.

Because of the multiple use of rangelands, range managers often work in such closely related fields as wildlife and watershed management, forest management, and recreation.

Places of Employment

About 3,000 persons worked as range managers in 1976. The majority worked for the Federal Government, principally for the Forest Service and the Soil Conservation Service of the Department of Agriculture and the Bureau of Land Management of the Department of the Interior. Range managers in State governments are employed in game and fish departments, State land agencies, and extension services.

An increasing number of range managers are working for private industry. Coal and oil companies employ range managers to help restore the ecological balance to mined out areas. Banks and real estate firms employ them to help increase the revenue from their landholdings. Other range managers work for private consulting firms and large livestock ranches.

Some range managers with advanced degrees teach and do research at colleges and universities. Others work overseas with United States and United Nations agencies and with foreign governments.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in range management or range science is the usual minimum educational requirement for range managers. In the Federal Government, a degree in a closely related field, such as agronomy or forestry, including courses in range management and range science, may also be accepted. Graduate degrees in range management are generally required for teaching and research positions, and may be helpful for advancement in other jobs.

In 1976, about 20 colleges and universities had degree programs in range management or range science. A number of other schools offered course work in range management.

A degree in range management requires a basic knowledge of biology, chemistry, physics, mathematics, and communication skills. Specialized courses combine plant, animal, and soil sciences with principles of ecology and resource management. Desirable electives include economics, computer science, forestry, wildlife, and recreation.

Federal Government agencies, primarily the Forest Service, the Soil Conservation Service, and the Bureau of Land Management, hire some college students for summer jobs in range management. This experience may better qualify these students for jobs when they graduate.

Besides having a love for the outdoors, range managers should be able to write and speak effectively and work with others. They should have the ability to work alone or under direct supervision. Good physical health and stamina also are important.

Employment Outlook

Employment of range managers is expected to grow faster than the average for all occupations through the mid-1980's. Job opportunities throughout this period are expected to be good for persons with degrees in range management or range science. Also, some jobs may be filled by persons with degrees in related fields who have had some range management courses.

An increasing demand for meat and other rangeland products should stimulate the need for more range managers. Since the amount of rangeland is generally fixed, range managers will be needed to increase the output of rangelands while protecting their ecological balance. Also, more range managers will be needed as the number of large livestock ranches increases.

As oil and coal exploration accelerates, private industry will probably require many more range specialists to rehabilitate ecologically disturbed areas.

The use of rangelands for other purposes such as wildlife protection and recreation could create additional needs for range managers. Federal hiring for these activities depends heavily upon legislation concerning the management of range resources.

Earnings and Working Conditions

In the Federal Government, range managers with the bachelor's degree started at either $9,303 or $11,523 in 1977, depending on their college grades. Those having 1 or 2 years of graduate work began at $11,523 or $14,097; persons with Ph. D. degrees started at either $14,097 or $17,056 a year. Range managers with the Federal Government averaged about $20,000 a year in 1977.

Salaries for range managers who work for State governments and private companies are about the same as those paid by the Federal Government, according to limited data.

Range managers may spend considerable time away from home working outdoors in remote parts of the range.

Sources of Additional Information

Information about a career as a range manager as well as a list of schools offering training is available from:

Society for Range Management, 2760 W. 5th Ave. Denver, Col. 80204.

For information about career opportunities in the Federal Government, contact:

Bureau of Land Management, Denver Service Center, Federal Center Building 50, Denver, Col. 80255.

Forest Service, U.S. Department of Agriculture, Washington, D.C. 20250.

Soil Conservation Service. U.S. Department of Agriculture, Washington, D.C. 20250.

REAL ESTATE AGENTS AND BROKERS

(D.O.T. 250.358)

Nature of the Work

Real estate agents and brokers represent property owners in selling or renting their properties. Brokers who belong to the National Association of Realtors receive the title, "Realtor;" agents who are members may use the title, "Realtor-Associate."

Brokers are independent business people who not only sell real estate, but also rent and manage properties, make appraisals, and develop new building projects. In closing sales, brokers usually arrange for loans to finance the purchases, for title searches, and for meetings between buyers and sellers when details of the transaction are agreed upon and the new owners take possession. Brokers also manage their own offices, advertise properties, and handle other business matters. Some combine other types of work, such as selling insurance or practicing law, with their real estate business.

Real estate agents generally are independent sales workers who contract their services with a licensed broker. Ways of doing business have changed in the last 10 years or so, and today, relatively few agents work as employees of a broker or realty firm.

Agents show and sell real estate, handle rental properties, and obtain "listings" (owner agreements to place properties for sale with the firm). Because obtaining listings is such an important job duty, agents may spend much time on the telephone exploring leads gathered from advertisements and personal contacts. When listing property for sale, agents make comparisons with similar property being sold to determine its fair market value. They also answer inquiries about properties over the telephone and interview potential buyers about their needs.

A worker who sells real estate or handles rental properties often must leave the office to call on prospects and drive them to inspect available properties. When a number of houses are for sale or rent in a new development, the agent may operate from a model unit.

Most real estate agents and brokers sell residential property. A few, usually in large firms, specialize in commercial, industrial, or other types of real estate. Each specialty requires knowledge of that particular type of property and clientele. Selling or leasing business property, for example, requires an understanding of leasing practices, business trends, and location needs. Agents who sell or lease industrial properties must know about transportation, utilities, and labor supply. To sell residential properties, the agent must know the location of schools, churches, shopping facilities, and public transportation. Familiarity with tax rates and insurance coverages also is important.

Places of Employment

About 450,000 persons sold real estate full time in 1976; many others sold on a part-time basis. The number of people licensed to sell totaled about 1.5 million in 1976, according to the National Association of Real Estate License Law Officials.

Most real estate firms are relatively small; indeed, some brokers operate a one-person business. Some large firms have several hundred real estate agents operating out of many branch offices. Most sales workers,

Most real estate sales workers work for small establishments.

however, work in firms with no more than 5 to 10 other agents. A growing number of brokers, currently about 1 in 5, have entered into franchise agreements with national or regional real estate organizations. Under this type of arrangement, similar to many fast-food restaurant operations, the broker pays a fee in exchange for the privilege of using the more widely known name of the parent organization. Although franchised brokers often receive help in training salespeople and in running their offices, they bear the ultimate responsibility for the success or failure of the firm.

Real estate is sold in all areas, but employment is concentrated in large urban areas and in smaller but rapidly growing communities.

Training, Other Qualifications, and Advancement

Real estate agents and brokers must be licensed in every State and in the District of Columbia. All States require prospective agents to be a high school graduate, be at least 18 years old, and pass a written test. The examination—more comprehensive for brokers than for agents—includes questions on basic real estate transactions and on laws affecting the sale of property. Most States require candidates for the general sales license to complete 30 hours of classroom instruction and those seeking the broker's license to complete 90 hours of formal training in addition to a specified amount of experience in selling real estate (generally 1 to 3 years). Some States waive the experience requirements for the broker's license for applicants who have a bachelor's degree in real estate. State licenses usually can be renewed annually without reexamination.

As real estate transactions have become more complex, many of the large firms have turned to college graduates to fill sales positions. A large number of agents have some college training and the number of college graduates selling real estate has risen substantially in recent years. However, personality traits are fully as important as academic background. Brokers look for applicants who possess such characteristics as a pleasant personality, honesty, and a neat appearance. Maturity, tact, and enthusiasm for the job are required in order to motivate prospective customers in this keenly competitive field. Agents also should have a good memory for names and faces and business details such as taxes, zoning regulations, and local land-use laws.

Young men and women interested in beginning jobs as real estate agents often apply in their own communities, where their knowledge of local neighborhoods is an advantage. The beginner usually learns the practical aspects of the job under the direction of an experienced agent.

Many firms offer formal training programs for both beginners and experienced agents. About 360 universities, colleges, and junior colleges offer courses in real estate. At some, a student can earn an associate's or bachelor's degree with a major in real estate; several offer advanced degrees. Many local real estate boards that are members of the National Association of Realtors sponsor courses covering the fundamentals and legal aspects of the field. Advanced courses in appraisal, mortgage financing, and property development and management also are available through various National Association affiliates.

Trained and experienced agents can advance in many large firms to sales or general manager. Persons who have received their broker's license may open their own offices. Training and experience in estimating property value can lead to work as a real estate appraiser, and people familiar with operating and maintaining rental properties may specialize in property management. Those who gain general experience in real estate, and a thorough knowledge of business conditions and property values in their localities, may enter mortgage financing or real estate counseling.

Employment Outlook

Employment of real estate agents and brokers is expected to rise faster than the average for all occupations in order to satisfy a growing demand for housing and other properties. In addition to opportunities that result from this growth, many openings will occur each year as workers die, retire, or leave for other reasons. Replacement needs are high because a relatively large number of people transfer to other work after a short time selling real estate.

The favorable outlook for employment in this field will stem primarily from increased demand for home purchases and rental units. Shifts in the age distribution of the population over the next decade will result in a larger number of young adults with careers and family responsibilities. This is the most geographically mobile group in our society and the one that traditionally makes the bulk of home purchases. As their incomes rise, these families also can be expected to purchase larger homes and vacation properties. During periods of declining economic activity and tight credit, the volume of sales and the resulting demand for salesworkers may decline. During these periods, the number of persons seeking sales positions may outnumber openings. Over the long run, however, the outlook for salespeople is excellent.

Many job opportunities should occur for both college graduates and mature workers transferring from other kinds of saleswork. This field will remain highly competitive and prospects will be best for well-trained, ambitious people who enjoy selling. The proportion of part-time real estate agents has declined in recent years as brokers have demanded greater skill and professionalism from those selling real estate. This decline is expected to continue as agents need more specialized knowledge to handle real estate transactions.

Earnings and Working Conditions

Commissions on sales are the main source of earnings—very few real estate agents work for a salary. The rate of commission varies according to the type of property and its value; the percentage paid on the sale of farm and commercial properties or unimproved land usually is higher than that paid for selling a home.

Commissions may be divided among several agents in a real estate firm. The person who obtains the listing often receives a part when the property is sold; the broker who makes the sale either gets the rest of the commission or shares it with the agent who handles the transaction. Although an agent's share varies greatly from one firm to another, often it is about half of the total amount received by the firm.

Earnings of full-time real estate agents averaged about $13,700 a year in 1976, according to estimates based on a survey conduct by the National Association of Realtors; agents working fewer than 30 hours a week averaged $3,400. Many experienced real estate agents earn $40,000 a year or more. According to the same survey estimates, real estate brokers earned about $27,000 a year in 1976. Full-time agents earn one and one-half times as much and brokers earn nearly three times as much as average earnings for all nonsupervisory workers in private industry, except farming.

Income usually increases as an agent gains experience, but individual ability, economic conditions, and the type and location of the property also affect earnings. Sales workers who are active in community organizations and local real estate boards can broaden their contacts and increase their earnings. A beginner's earnings often are irregular because a few weeks or even months may go by without a sale. Although some brokers allow an agent a drawing account against future earnings, this practice is not usual with new employees. The beginner, therefore, should have enough money to live on until commissions increase.

Brokers provide office space, but agents generally furnish their own automobiles. Agents and brokers often work in the evenings and during weekends to suit the convenience of customers. Some firms, especially the large ones, furnish group life, health, and accident insurance.

Sources of Additional Information

Details on licensing requirements for real estate agents and brokers are available from most local real estate organizations or from the real estate commission or board located in each State capital. Many States can furnish manuals helpful to applicants who are preparing for the required written examinations.

For more information about opportunities in real estate work, as well as a list of colleges and universities offering courses in this field, contact:

National Association of Realtors, 430 N. Michigan Ave., Chicago, Illinois 60611.

REGISTERED NURSES

(D.O.T. 075.118 through .378)

Nature of the Work

Nursing plays a major role in health care. As important members of the health care team, registered nurses perform a wide variety of functions. They observe, evaluate, and record symptoms, reactions, and progress of patients; administer medications; assist in the rehabilitation of patients; instruct patients and family members in proper health maintenance care; and help maintain a physical and emotional environment that promotes recovery.

Some registered nurses provide hospital care. Others perform research activities or instruct students. The setting usually determines the scope of the nurse's responsibilities.

Hospital nurses constitute the largest group of nurses. Most are staff nurses who provide skilled bedside nursing care and carry out the medical treatment prescribed by physicians. They may also supervise practical nurses, aides, and orderlies. Hospital nurses usually work with groups of patients that require similar nursing care. For instance, some nurses work with patients who have had surgery; others care for children, the elderly, or the mentally ill. Some are administrators of nursing services.

Employment opportunities for registered nurses are expected to be favorable through the mid-1980's.

Private duty nurses give individual care to patients who need constant attention. The private duty nurse is self-employed and may work in a home, in a hospital, or in a convalescent institution.

Office nurses assist physicians, dental surgeons, and occasionally dentists in private practice or clinics. Sometimes they perform routine laboratory and office work in addition to their nursing duties.

Community health nurses care for patients in clinics, homes, schools, and other community settings. They instruct patients and families in health care and give periodic care as prescribed by a physician. They may also instruct groups of patients in proper diet and arrange for immunizations. These nurses work with community leaders, teachers, parents, and physicians in community health education. Some community health nurses work in schools.

Nurse educators teach students the principles and skills of nursing, both in the classroom and in direct patient care. They also conduct continuing education courses for registered nurses, practical nurses, and nursing assistants.

Occupational health or industrial nurses provide nursing care to employees in industry and government and, along with physicians, promote employee health. As prescribed by a doctor, they treat minor injuries and illnesses occurring at the place of employment, provide for the needed nursing care, arrange for further medical care if necessary, and offer health counseling. They also may assist with health examinations and inoculations.

(Licensed practical nurses who also perform nursing services are discussed elsewhere in the *Handbook*.)

Places of Employment

About 960,000 persons worked as registered nurses in 1976. About one-third worked on a part-time basis.

About three-quarters of all registered nurses worked in hospitals, nursing homes, and related institutions. Community health nurses in government agencies, schools, visiting nurse associations, and clinics numbered about 65,000; nurse educators in nursing schools accounted for about 33,000; and occupational health nurses in industry, about 20,000. About 100,000 more worked in the offices of physicians or other health practitioners, or were private duty nurses hired directly by patients. Most of the others were staff members of professional nurse and other organizations or worked for State boards of nursing or research organizations.

Training, Other Qualifications, and Advancement

A license is required to practice professional nursing in all States and in the District of Columbia. To get a license, a nurse must be a graduate of a school of nursing approved by the State board of nursing and pass a written State competency examination. Nurses may be licensed in more than one State, either by examination or endorsement of a license issued by another State.

Three types of educational programs—diploma, baccalaureate, and associate degree—prepare candidates for licensure. However, a minimum of a baccalaureate degree is preferred for those who aspire to administrative or management positions, and those planning to work in research, consultation, teaching, or clinical specialization, which require education at the master's level. Graduation from high school is required for admission to all schools of nursing.

Diploma programs are conducted by hospital and independent schools and usually require 3 years of training. Bachelor's degree programs usually require 4 years of study in a college or university, although a few require 5 years. Associate degree programs in junior and community colleges require approximately 2 years of nursing education. In addition, several programs provide licensed practical nurses with the training necessary to upgrade themselves to registered nurses while they continue to work part time. These programs generally offer an associate of arts degree. In 1976, about 1,375 programs (associate, diploma, and baccalaureate) were offered in the United States. In addition, there were 102 master's degree and 12 doctoral degree programs in nursing.

Programs of nursing include classroom instruction and supervised nursing practice in hospitals and health facilities. Students take courses in anatomy, physiology, microbiology, nutrition, psychology, and nursing. They also get supervised clinical experience in the care of patients who have different types of health problems. Students in bachelor's degree programs as well as in some of the other programs are assigned to community agencies to learn how to care for patients in clinics and in the patients' homes. Varying amounts of general education are combined with nursing education in all three types of programs.

Students who need financial aid may qualify for federally sponsored nursing scholarships or low-interest loans. Those who want to pursue a nursing career should have a sincere desire to serve humanity and be sympathetic to the needs of others. Nurses must be able to accept responsibility and direct or supervise the activity of others; must have initiative, and in appropriate situations be able to follow orders precisely or determine if additional consultation is required; and must use good judgment in emergencies. Good mental health is needed in order to cope with human suffering and frequent emergency situations. Staff nurses need physical stamina because of the amount of time spent walking and standing.

From staff positions in hospitals, experienced nurses may advance to head nurse, assistant director, and director of nursing services. A master's degree, however, often is required for supervisory and administrative positions, as well as for positions in nursing education, clinical specialization, and research. Public health agencies require a baccalaureate degree for employment. Advancement may be difficult for nurses who do not have a baccalaureate or master's degree in community health nursing.

A growing movement in nursing, generally referred to as the "nurse practitioner program" is opening new career possibilities. Several postbaccalaureate programs prepare nurses for highly independent roles in the clinical care and teaching of patients. These nurses practice in primary roles that include pediatrics, geriatrics, community health, mental health, and medical-surgical nursing.

Employment Outlook

Employment opportunities for registered nurses are expected to be favorable through the mid-1980's. Some competition for more desirable, higher paying jobs is expected in areas where training programs abound, but opportunities for full- or part-time work in present shortage areas, such as some southern States and many inner-city locations, are expected to be very good through 1985. For nurses who have had graduate education, the outlook is excellent for obtaining positions as administrators, teachers, clinical specialists, and community health nurses.

Growth in employment of registered nurses is expected to be faster than the average for all occupations because of extension of prepayment programs for hospitalization and medical care, expansion of medical services as a result of new medical techniques and drugs, and increased interest in preventive medicine and rehabilitation of the handicapped. In addition to the need to fill new positions, large numbers of nurses will be required to replace those who leave the field each year.

Earnings and Working Conditions

Registered nurses who worked in hospitals in 1976 received average starting salaries of $11,820 a year, according to a national survey conducted by the University of Texas Medical Branch. This was above the average for nonsupervisory workers in private industry, except farming.

Registered nurses in nursing homes can expect to earn slightly less than those in hospitals. Salaries of industrial nurses averaged $240 a week in mid-1976, according to a survey conducted by the Bureau of Labor Statistics.

In 1977, the Veterans Administration paid inexperienced nurses who had a diploma or an associate degree starting salaries of $10,370 a year; those with baccalaureate degrees, $12,131. Nurses employed in all Federal Government agencies earned an average of $15,500 in 1977.

Most hospital and nursing home nurses receive extra pay for work on evening or night shifts. Nearly all receive from 5 to 13 paid holidays a year, at least 2 weeks of paid vacation after 1 year of service, and also some type of health and retirement benefits.

Sources of Additional Information

For information on approved schools of nursing, nursing careers, loans, scholarships, salaries, working conditions, and employment opportunities, contact:

Coordinator, Undergraduate Programs, Department of Nursing Education, American Nurses' Association, 2420 Pershing Rd., Kansas City, Mo. 64108.

For career information and a list of schools of nursing, contact:

Career Information Services, National League for Nursing, 10 Columbus Circle, New York, N.Y. 10019.

Information about employment opportunities in the Veterans Administration is available from:

Department of Medicine and Surgery, Veterans Administration, Washington, D.C. 20420.

SECURITIES SALES WORKERS

(D.O.T. 251.258)

Nature of the Work

When investors want to buy or sell stocks, bonds, or shares in mutual funds, they call on securities sales workers to put the "market machinery" into operation. Both the individual who invests a few hundred dollars and the large institution with millions to invest need such services. Often these workers are called *registered representatives*, *account executives*, or *customers' brokers*.

In initiating "buy" or "sell" transactions, securities sales workers relay orders through their firms' offices to the floor of a securities exchange. When the security is traded in the over-the-counter market instead, they send the order to the firm's trading department. In either case, the sales worker promptly notifies the customer of the completed transaction and the final price.

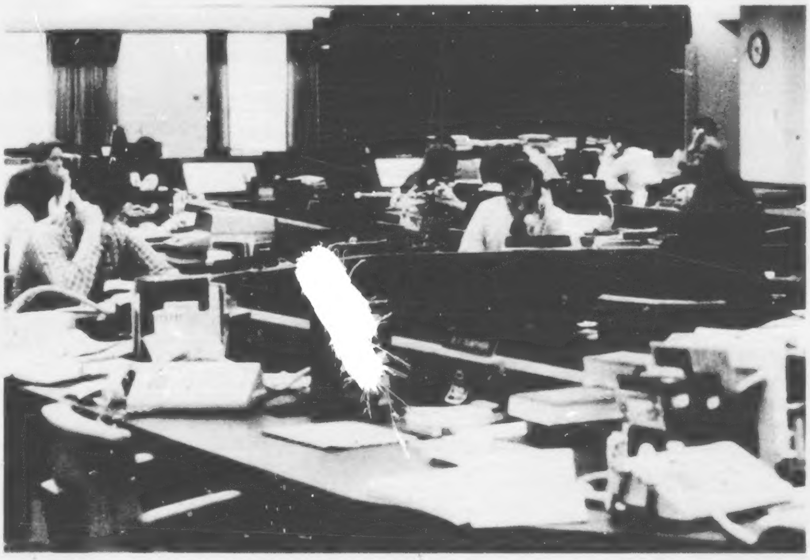
In addition, they provide many related services for their customers. They may explain to new investors the meaning of stock market terms and trading practices; offer the client complete financial counseling; devise an individual financial portfolio including securities, life insurance, and other investments for the customer; and advise on the purchase or sale of a particular security. Some individuals may prefer long-term investments designed for either capital growth or income over the years; others might want to invest in short-term securities that hopefully will rise in price quickly. Securities sales workers furnish information about the advantages and disadvantages of each type of investment based on each person's objectives. They also supply the latest stock and bond quotations on any security in which the investor is interested, as well as information on the activities and financial positions of the corporations these securities represent.

Securities sales workers may serve all types of customers or they may specialize in one type only, such as institutional investors. They also may specialize in handling only certain kinds of securities such as mutual funds. Some handle the sale of "new issues," such as corporation securities issued for plant expansion funds.

Beginning securities sales workers spend much of their time searching for customers. Once they have established a clientele, however, they put more effort into servicing existing accounts and less into seeking new ones.

Places of Employment

About 90,000 persons sold securities full time in 1976. It is estimated that an additional 100,000 persons sold securities less than full time. These include partners and branch office managers in securities firms,



Beginning securities sales workers spend much of their time searching for customers.

insurance agents and brokers offering securities to their customers, and part-time mutual fund representatives.

Securities sales workers are employed by brokerage firms, investment bankers, and mutual funds in all parts of the country. Many of these firms are very small. Most sales workers, however, work for a small number of large firms with main offices in big cities (especially in New York) or the approximately 6,000 branch offices in other areas.

Training, Other Qualifications, and Advancement

Because a securities sales worker must be well informed about economic conditions and trends, a college education is increasingly important, especially in the larger securities firms. This is not true, however, for part-time work selling mutual funds. Although employers seldom require specialized training, courses in business administration, economics, and finance are helpful.

Almost all States require persons who sell securities to be licensed. State licensing requirements may include passing an examination and furnishing a personal bond. In addition, sales workers usually must register as representatives of their firms according to regulations of the securities exchanges where they do business or the National Association of Securities Dealers, Inc. (NASD). Before beginners can qualify as registered representatives, they must pass the Securities and Exchange Commission's General Securities Examination, or examinations prepared by the exchanges or the NASD. These tests measure the prospective representative's knowledge of the securities business. Character investigations also are required. Before securities sales workers can sell insurance, they must be licensed by the State in which they live.

Most employers provide training to help sales workers meet the requirements for registration. In member firms of all major exchanges the training period is at least 4 months. Trainees in large firms may receive classroom instruction in security analysis and effective speaking, take courses offered by schools of business and other institutions and associations, and undergo a period of on-the-job training. In small firms, and in mutual funds and insurance companies, training programs may be brief and informal. Beginners read assigned materials and watch other sales workers transact business.

Many employers consider personality traits as important as academic training. Employers seek applicants who are well groomed, able to motivate people, and ambitious. Because maturity and the ability to work independently also are important, a growing number of employers prefer to hire those who have achieved success in other jobs. Successful sales or managerial experience is very helpful to an applicant.

The principal form of advancement for securities sales workers is an increase in the number and the size of the accounts they handle. Although beginners usually service the accounts of individual investors, eventually they may handle very large accounts such as those of banks and pension funds. Some experienced sales workers advance to positions as branch office managers, who supervise the work of other sales workers while executing "buy" and "sell" orders for their own customers. A few representatives may become partners in their firms or do administrative work.

Employment Outlook

The number of securities sales workers is expected to grow about as fast as the average for all occupations through the mid-1980's as investment in securities continues to increase. In addition to jobs resulting from growth, several thousand sales workers will be needed annually to replace those who die, retire, or transfer to other jobs. Replacement needs are relatively large, due to the competitive nature of the occupation. Many sales workers leave their jobs each year because they are unable to establish a successful clientele.

Employment of securities sales workers is expected to expand as economic growth and rising personal incomes increase the funds available for investment. Growth in the number of institutional investors will be particularly strong as more people purchase insurance; participate in pension plans; and contribute to the endowment funds of colleges and other nonprofit institutions. In addition, more workers will be needed to sell securities issued by new and expanding corporations and by State and local governments financing public improvements.

The demand for securities sales workers fluctuates as the economy expands and contracts. Thus, in an economic downturn, the number of persons seeking jobs may exceed the number of openings—sometimes by a great deal. Over the long run, however, job opportunities for securities sales workers are expected to be favorable. During severe slumps in market activity, job prospects and income stability will be greater for sales workers who are qualified to provide their clients with complete financial services than for those who rely strictly on commissions from stock transactions.

Mature individuals with successful work experience should find many job opportunities. Demand will be strongest for well-rounded persons who are willing to learn all aspects of the securities business. Those seeking part-time work will be limited to selling shares in mutual funds.

Earnings and Working Conditions

Trainees usually are paid a salary until they meet licensing and registration requirements. After registration, a few firms continue to pay a salary until the new representative's commissions increase to a stated amount. The salaries paid during training usually range from $650 to $850 a month; those working for large securities firms may receive higher salaries.

After candidates are licensed and registered, their earnings depend on commissions from the sale or purchase of stocks and bonds, life insurance, or other securities for customers. Commission earnings are likely to be high when there is much buying and selling, and lower when there is a slump in market activity. Most firms provide sales workers with a steady income by paying a "draw against commission"—that is, a minimum salary based on the commissions which they can be expected to earn. A few firms pay sales workers only salary and bonuses that usually are determined by the volume of company business.

Earnings of full-time, experienced securities sales workers who service individual investors averaged about $25,000 a year in 1976, according to the limited data available. Those who service institutional accounts earned about $44,000. Full-time securities sales workers earn about three times as much as average earnings for nonsupervisory workers in private industry, except farming.

Securities sales workers usually work in offices where there is much activity. In large offices, for example, rows of sales workers sit at desks in front of "quote boards" that continually flash information on the prices of securities transactions. Although established sales workers usually work the same hours as others in the business community, beginners who are seeking customers may work longer. Some sales workers accommodate customers by meeting with them in the evenings or on weekends.

Sources of Additional Information

Further information concerning a career as a securities sales worker is available from:

Securities Industry Association, 20 Broad St.,
New York, N.Y. 10005. (There is a $1
charge for this material.)

Career information also may be obtained from the personnel department of individual securities firms.

SINGERS

(D.O.T. 152.028 and .048)

Nature of the Work

Singing is an age-old form of communication which, in one form or another, can be understood and appreciated by almost everyone. Professional singing often requires not only a fine voice but also a highly developed technique and a broad knowledge of music. A small number of singing stars make recordings or go on concert tours in the United States and abroad. Somewhat larger numbers of singers obtain leading or supporting roles in operas and popular music shows, or secure engagements as concert soloists in oratorios and other types of performances. Some singers also become members of opera and musical comedy choruses or other professional choral groups. Popular music singers perform in musical shows of all kinds—in the movies, on the stage, on radio and television, in concerts, and in nightclubs and other entertainment places. The best known popular music singers make and sell many recordings.

Some singers combine their work as performers with other related jobs. Many give private voice lessons. A number of singers teach and direct choruses in elementary and secondary schools. (See the statements on teachers elsewhere in the *Handbook*.) Others give voice training or direct choral groups in churches, music conservatories, or colleges and universities.

Places of Employment

About 23,000 persons worked as professional singers in 1976. Many others were employed as music teachers in elementary and secondary schools, colleges, universities, and conservatories throughout the country. Opportunities for singing engagements are concentrated mainly in New York City, Los Angeles, Las Vegas, San Francisco, Dallas, and Chicago—the Nation's chief entertainment centers. Nashville, Tennessee, a major center for country and western music, is one of the most important places for employment of singers for "live" performances and recordings. Many singers work part time as church singers and choirmasters.

Training and Other Qualifications

Persons who want to sing professionally should acquire a broad background in music, including its theory and history. The ability to dance may be helpful, since singers sometimes are required to dance. In addition, those interested in a singing career should start piano lessons at an early age to become familiar with music theory and music composition. As a rule, voice training should not begin until after the individual has matured physically, although young boys who sing in church choirs receive some training before their voices change. An audition often is required for advanced voice training. Since voice training often continues for years after the singer's professional career has started, a prospective singer must have great determination.

To prepare for careers as singers of classical music, young people can take private voice lessons or enroll in a music conservatory or a school or department of music in a college or university. These schools provide voice training and training in understanding and interpreting music, including music-related training in foreign languages and, sometimes, dramatic training. After completing 4 years of study, the graduate may receive the degree of bachelor of music, bachelor of science or arts (in music), or bachelor of fine arts.

Singers who plan to teach in public schools need at least a bachelor's degree in music and must meet the State certification requirements for teachers. About 750 conservatories and colleges and universities offer a bachelor's degree program in music education. In addition, almost 500 colleges and universities offer training in musical performance, composition, and theory, leading to a bachelor's degree. Most college teachers must have a master's degree or Ph. D. degree, but exceptions may be made for well-qualified artists.

Although voice training is an asset for singers of popular music, many with untrained voices have had successful careers. The typical popular song does not demand that the voice

Young people who want to sing professionally should acquire a broad background in music.

be developed to cover as wide a range on the musical scale as does classical music, and the lack of voice projection may be overcome by use of a microphone.

Young singers of popular songs may become known by participating in local amateur and paid shows. These engagements may lead to employment with local dance bands or rock groups and possibly later with better known ones.

In addition to musical ability, a singing career requires an attractive appearance, poise and stage presence, and perseverance. Singers also must have physical stamina to adapt to frequent traveling and rigorous time schedules, which often include night performances.

Employment Outlook

Employment of singers is expected to grow about as fast as the average through the mid-1980's, but competition for jobs will be keen. Many short-term jobs are expected in the opera and concert stage, movies, theater, nightclubs, and other areas. The demand is growing for singers who record popular music to do radio and television commercials. However, these short-term jobs are not enough to provide steady employment for all qualified singers.

Earnings and Working Conditions

Singers generally work at night and on weekends, and must spend much time in practice and in rehearsals. Work in the entertainment field is seasonal and few performers have steady jobs. Except for a few well-known concert soloists, opera stars, top recording artists of popular music, and some dance band singers, most professional singers experience difficulty in obtaining regular employment and have to supplement their incomes with other kinds of jobs. Moreover, a singing career sometimes is relatively short, since it depends on a good voice, physical stamina, and public acceptance of the artist, all of which may be affected by age.

Concert singers who were part of a chorus earned a minimum daily rate of $25 in 1976, or $45 to $50 per performance. Members of an opera chorus earned a minimum daily rate of $30, or $40 per performance. A featured soloist received a minimum of $200 for each performance. A few opera soloists and popular singers, however, earned thousands of dollars per performance. Minimum wage rates for singers on television ranged from around $143 to about $161 per singer for a 1-hour show, depending on the number of singers in the group.

Professional singers usually belong to a branch of the AFL-CIO union, the Associated Actors and Artistes of America. Singers on the concert stage or in opera belong to the American Guild of Musical Artists, Inc.; those who sing on radio or live television or make phonograph recordings are members of the American Federation of Television and Radio Artists; singers in the variety and nightclub field belong to the American Guild of Variety Artists; those who sing in musical comedy and operettas belong to the Actors' Equity Association; and those who sing in the movies belong to the Screen Actors Guild, Inc.

Sources of Additional Information

Information about accredited schools and departments of music is available from:

National Association of Schools of Music,
11250 Roger Bacon Dr., Reston, Va. 22090.

Further information about careers in music is available from:

Music Educators National Conference, 1902
Association Dr., Reston, Va. 22091.

SOCIAL WORKERS

(D.O.T. 195.108, .118, .168, and .228)

Nature of the Work

The ability of people to live effectively in society often is hampered by lack of resources and problems that range from personal ones to those arising from social unrest within a group or community. These problems, aggravated by the growing complexity of society, have greatly increased the need for social services. Social workers assist individuals, families, groups and communities in using these services to solve their problems, and work to improve the resources available to enhance social functioning.

The three traditional approaches to social work have been casework, group work, and community organization. The approach chosen usually is determined by the nature of the problem and the time and resources available for solving it. Social workers often combine these approaches in dealing with a specific problem. However, recently developed ways of organizing curriculums and training social workers have resulted in other approaches to the field. In addition to the traditional methods, social workers may specialize in social institutions which encompasses health, education, and other areas; social problems including poverty; and along other organizing principles and fields of practice.

In casework, social workers use interviews to identify the problems of individuals and families. They then help people to understand and solve their problems and secure the appropriate resources, services, education, or job training. In group work, social workers help people understand themselves and others, overcome racial and cultural prejudices, and work with others in achieving a common goal. They plan and conduct activities for children, teenagers, adults, older persons, and other groups of people in settings such as community centers, hospitals, nursing homes, and correctional institutions. In community organization, social workers coordinate the efforts of groups, such as political, civic, religious, business, and union organizations, to combat social problems through community programs. For a neighborhood or larger area, they may help plan and develop health, housing, welfare, and recreation services. Social workers often coordinate existing social services, organize fund raising for community social welfare activities, and aid in the development of new community services.

The majority of social workers provide social services directly to individuals, families, or groups. However, a substantial number are directors, administrators, or supervisors. Directors of social service agencies have responsibilities much like those of administrators anywhere. They hire and train personnel, make budgetary decisions, develop and evaluate agency problems, solicit new funds, supervise the staff, and serve as a spokesperson for the agency's clients. Some social workers are college teachers, research workers, or consultants. Others work for community agencies and planning bodies at all levels of government, voluntary agencies, and other private organizations.

Social workers apply their training and experience in a variety of settings. While most work for agencies or institutions, growing numbers of social workers are in private practice and provide counseling services on a fee basis.

Social workers in family and child service positions in public and in voluntary agencies such as those run by religious charities, provide counseling and social services that assist individual adjustment, strengthen personal and family relationships, and help clients to cope with their problems. They provide information and referral services in many areas—advising clients on how to plan family budgets and manage money, finding homes for families who have nowhere to go, arranging homemaker assistance for elderly couples who no longer can manage household chores, providing information on job training and day care for parents trying to support a family, and providing help with interpersonal difficulties.

Social workers in child welfare positions work to improve the physical and emotional well-being of deprived and troubled children and youth. They may advise parents on child care and child rearing, counsel children and youth with social adjustment difficulties, and arrange homemaker services during a parent's illness. Social workers may also be called upon to institute legal action for the protection of neglected or mistreated children, provide services to unmarried parents, and counsel couples who wish to adopt a child. After making appropriate case evaluations and home studies, they may place and oversee children in suitable adoption or foster homes or in specialized institutions.

School social workers aid children whose unsatisfactory school progress is related to their social problems.

Some social workers specialize in child welfare.

These workers consult and work with parents, teachers, counselors, and other school and community personnel to identify and solve problems that hinder satisfactory adjustment and learning.

Social workers also are employed in medical and psychiatric settings, such as hospitals, clinics, mental health agencies, rehabilitation centers, and public welfare agencies. They aid patients and their families with social problems that may accompany illness, recovery, and rehabilitation. As members of medical teams, social workers help patients respond to treatment and guide them in readjusting to their homes, jobs, and communities. Renal social workers (those who deal with patients suffering from kidney disease and their families) and social workers specializing in drug addition perform such functions. (The related occupation of rehabilitation counselor is discussed in a separate statement.)

A growing number of social workers specialize in the field of aging. Many work with elderly persons in public welfare agencies and family service agencies, although workers also are employed in senior centers, helping people deal with financial and role changes brought about by retirement; in area agencies, focusing on planning and evaluating services to the elderly; and in nursing homes, helping patients and their families adjust to illness and the need for institutionalization.

Social workers in correctional institutions and others engaged in correctional programs help offenders and persons on probation and parole readjust to society. They counsel on social problems faced in returning to family and community life, and also may help secure necessary education, training, employment, or community services.

Places of Employment

About 330,000 social workers were employed in 1976. Among these, two-thirds provide direct social services working for public and voluntary agencies, including State departments of public assistance and community welfare and religious organizations. Most of the remainder are involved in social policy and planning, community organization, and administration in government agencies, primarily on the state and local level, while still others work for schools or for hospitals, clinics, and other health facilities. A small but growing number of social workers are employed in business and industry.

Although employment is concentrated in urban areas, many work with rural families. A small number of social workers—employed by the Federal Government and the United Nations or one of its affiliated agencies—serve in other parts of the world as consultants, teachers, or technicians and establish agencies, schools, or assistance programs.

Training, Other Qualifications, and Advancement

Only in the last few years has the bachelor's degree in social work (BSW), rather than the master's degree (MSW), been fully accepted as the minimum education of the professional social worker. The BSW programs generally provide content in the areas of social work practice, social welfare policies and service, human behavior and the social environment, social research, and supervised field experience. Generally, BSW programs prepare people for direct service positions such as case worker or group worker. Quite a few workers in this field have degrees in the liberal arts or humanities, sociology and psychology being the most prevalent majors. However, opportunities for advancement to high-level supervisory and administrative positions tend to be limited for those without graduate training in social work, and are particularly limited for persons with no formal training in this field.

For many positions, a master's degree in social work is preferred or required. Two years of specialized study and supervised field instruction generally are required to earn an MSW. Field placement affords one the opportunity to test his or her suitability for social work practice. The student may develop expertise in a specialized area and make contacts helpful in later securing a permanent position. Previous training in social work is not required for entry into a graduate program, but courses in related fields such as psychology, sociology, economics, political science, history, social anthropology, and urban studies, as well as social work, are recommended. Some graduate schools recently have established accelerated MSW programs for a limited number of highly qualified BSW recipients. However, applicants to graduate programs in social work may face keen competition.

In 1976, over 170 colleges and universities offered accredited undergraduate programs in social work while over 80 offered accredited graduate programs. More than 20 have incorporated a gerontological emphasis into their programs. Graduate students may specialize in clinical social work, community organization, administration, teaching, research, social policy planning, and a variety of other areas. Some schools offer concentrations in many areas while others offer fewer choices.

A limited number of scholarships and fellowships are available for graduate education. Because of increased costs, social welfare agencies have reduced their practice of granting workers "educational leave" to obtain graduate education.

A graduate degree and experience generally are required for supervisory, administrative, or research work, the last also requiring training in social science research methods. Many administrators have a background in social work, business or public administration, education, or health administration. For teaching positions, an MSW is required and a doctorate usually is preferred. In government agencies, most applicants for employment must pass a written exam, with the exception of some high-level positions.

In mid-1976, 20 States had licensing or registration laws regarding social work practice and the use of professional social work titles by those who qualify. Usually work experience, an examination, or both, are necessary for licensing or registration, with periodic renewal required.

The National Association of Social Workers allows the use of the title ACSW (Academy of Certified Social Workers) for those members having at least 2 years of postmaster's job experience who have passed the ACSW examination. In view of the emerging trend towards specialization at advanced levels of social work practice, efforts are being made to devise specialized examinations in addition to the general ACSW examination currently given.

Social workers should be emotionally mature, objective, and sensitive, and should possess a basic concern for people and their problems. They must be able to handle responsibility, work independently, and maintain good working relationships with clients and coworkers.

Students should obtain as much related work experience as possible during high school and college to determine whether they have the interest and capacity for professional social work. They may do volunteer, part-time, or summer work in places such as camps, settlement houses, hospitals, community centers, or social welfare agencies. Some voluntary and public social welfare agencies occasionally hire students for jobs in which they assist social workers.

Employment Outlook

Employment of social workers is expected to increase faster than the average for all occupations through the mid-1980's. The recent passage of Title XX of the Social Security Act, the potential development of national health insurance, and the expansion of services in public education should contribute to a continued increase in employment in social services. Many new positions will come from the expansion of health services in hospitals, nursing homes, community mental health centers, and home health agencies. Other areas expected to offer employment opportunities include services for the aging; counseling in the areas of consumerism, rape, and drug and alcohol abuse; and social planning. Relatively high levels of unemployment coupled with problems caused by social change are expected to sustain a strong demand for persons in the social service field. The increasing need for social workers to assist other professionals in such fields as health planning, transportation, law, and public administration also should stimulate employment growth. In addition to jobs resulting from employment growth, thousands of openings will result annually from deaths and retirements.

If the number of students graduating from social work programs continues to increase at the same rate as in the 1960's and early 1970's, persons having bachelor's degrees in social work will face increasing job competition. Graduates of master's and doctor's degree programs in social work are more qualified for a wider range of jobs including administrative, research, planning, and teaching positions, and are expected to have good opportunities through the mid-1980's.

Because many cities are experiencing financial crises often resulting in budget cuts in human service activities, applicants in these areas may face keen competition. Graduates often prefer to work in major metropolitan areas, since small towns and rural areas offer less opportunity for professional contact with colleagues and have fewer academic institutions for continuing education necessary for advancement. However, job opportunities may be more favorable in rural areas and small towns.

Earnings and Working Conditions

Salaries for social workers at all levels vary greatly by type of agency (private or public, Federal, State, or local) and geographic region. Average earnings for social workers are higher than those for nonsupervisory workers in private industry, except farming. Salaries generally are highest in large cities and in States with sizable urban populations. Private practitioners and those in administration, teaching, and research often earn considerably more than social workers in other settings.

Starting salaries for social case workers (positions requiring a bachelor's degree) in State and local governments averaged about $9,500 in 1976, according to a survey by the International Personnel Management Association; for psychiatric social workers and case work supervisors (positions requiring a master's degree), about $12,000.

The average annual starting salary for social workers (positions requiring an MSW and 1 year of related experience) in hosptials and medical centers was about $12,100 in 1976, according to a survey conducted by the University of Texas Medical School. Top salaries for experienced social workers in these settings averaged $15,600, and some were as high as $25,300.

In the Federal Government, social workers with an MSW and no experience started at $11,523 or $14,097 in 1977. Graduates with a Ph. D. or job experience may start at higher salaries. Most social workers in the Federal Government are employed by the Veterans Administration and the Departments of Health, Education, and Welfare, Justice, and Interior.

Most social workers have a 5-day, 35 to 40-hour week. However, many, particularly in private agencies, work part time. In some agencies, the nature of the duties requires some evening and weekend work, for which compensatory time off is given. Most social work agencies provide fringe benefits such as paid vacation, sick leave, and retirement plans.

Sources of Additional Information

For information about career opportunities in the various fields of social work, contact:

National Association of Social Workers, 1425 H St. NW., Suite 600, Southern Building, Washington, D.C. 20005.

Information on accredited graduate and undergraduate college programs in social work is available from:

Council on Social Work Education, 345 East 46th St., New York, N.Y. 10017.

SOCIOLOGISTS

(D.O.T. 054.088)

Nature of the Work

Sociologists study human society and social behavior by examining the groups that humans form. These groups include families, tribes, communities, and governments, along with a variety of social, religious, political, business, and other organizations. Sociologists study the behavior and interaction of groups; trace their origin and growth; and analyze the influence of group activities on individual members.

Some sociologists concern themselves primarily with the characteristics of social groups and institutions. Others are more interested in the ways individuals are affected by groups to which they belong.

Important fields of specialization for sociologists include social organization, social pathology and psychology, rural or urban sociology, criminology and penology, demography, industrial sociology, and medical sociology—the study of social factors that affect mental and public health. Increasingly, sociologists are finding opportunities to apply their professional knowledge and methods in areas of practice as diverse as intergroup relations, family counseling, public opinion analysis, law, education, public relations, regional and community planning, and environmental planning.

Most sociologists are college and university teachers; some are involved in research, writing, administration, and other nonteaching activities. Sociological research, like other kinds of social science research, involves collecting information, preparing case studies, testing, and conducting surveys and laboratory experiments. Increasingly, sociologists apply advanced statistical and computer techniques in their research. The results of sociological research often aid educators, lawmakers, administrators, and other officials interested in local, national, or international social problems. Sociologists work closely with members of other professions including psychologists, physicians, economists, political scientists, anthropologists, and social workers.

Sociologists spend a great deal of their time in study and research.

Some sociologists supervise the operation of social service agencies such as family and marriage clinics. Others, acting as consultants, advise on diverse problems such as the management of hospitals for the mentally ill, the rehabilitation of juvenile delinquents, or the development of effective advertising programs to promote public interest in particular products such as television sets or cars.

Places of Employment

About 19,000 persons worked as sociologists in 1976, excluding those teaching in secondary schools.

Colleges and universities employ about four-fifths of all sociologists. A number work for Federal, State, local, or international government agencies, and are professionally concerned with such subjects as poverty, welfare services and other public assistance programs, population problems, social rehabilitation, community development, and environmental impact studies. Some work in private industry, research firms, management consulting firms, welfare or other nonprofit organizations, or else are self-employed. Some work in positions that require training in sociology and related disciplines, but are not classified as professional sociologists. Related fields include social work, recreation, and public health.

Since sociology is taught in most institutions of higher learning, sociologists may be found in nearly all college communities. They are most heavily concentrated, however, in large colleges and universities that offer graduate training in sociology and opportunities for research.

Training, Other Qualifications, and Advancement

A master's degree and a major in sociology usually is the minimum requirement for employment as a sociologist. The Ph. D. degree is essential for appointment as a professor and for tenure in almost all colleges or universities. The Ph. D. commonly is required for directors of major research projects, important administrative positions, or consultants.

Sociologists with master's degrees can qualify for many administrative and research positions, provided they have sufficient training in research, statistical, and computer methods. Advancement from these to supervisory positions in both public and private agencies generally is based on experience. Sociologists with master's degrees may qualify for some college instructorships. Most colleges, however, appoint as instructors only people who have training beyond the master's level—frequently the completion of all requirements for the Ph. D. degree except the doctoral dissertation. Outstanding graduate students may get teaching or research assistantships that provide both financial aid and valuable experience.

Bachelor's degree holders in sociology may get jobs as interviewers or as administrative or research assistants. Many work as social workers, counselors, or recreation workers in public and private welfare agencies. Sociology majors who have sufficient training in statistics may get positions as beginning analysts or statisticians.

Over 1,200 colleges and universities offer bachelor's degree programs in sociology; about 145 offer master's degrees; and about 125 have doctoral programs. Sociology departments offer a wide variety of courses including sociological theory, statistics and quantitative methods, dynamics of social interaction, sex roles, population, social stratification, social control, small group analysis, rural-urban relations, formal and complex organizations, sociology of religion, law, the arts, war, politics, education, occupations and professions, and mental health, in addition to many others.

In the Federal Government, candidates generally must have 24 semester hours in sociology, with course work including theory and methods of social research. However, since positions as professional sociologists are quite limited, advanced study in the field is highly recommended.

The choice of a graduate school is important for people who want to become sociologists. Students should select schools that have adequate research facilities and offer appropriate areas of specialization such as theory, social psychology, or quantitative methods. Opportunities to gain practical research experience also may be available, and sociology departments frequently aid in the placement of graduates.

Sociologists spend a great deal of their time in study and research. They must be able to communicate effectively, both orally and in writing. The ability to work as part of a group as well as independently is important.

Employment Outlook

Employment of sociologists is expected to increase more slowly than the average for all occupations through the mid-1980's. Most openings will result from deaths, retirements, and other separations from the labor force. Some academic openings will result from the growing trend to include sociology courses in the curriculums of other professions, such as medicine, law, business administration and management, and education. Demand in the nonteaching area will center around public and private programs dealing with the development of human resources, particularly those designed to cope with social and welfare problems.

The number of persons who will graduate with advanced degrees in sociology is likely to greatly exceed available job openings. Graduates with a Ph. D. face increasing competition for academic positions, although those with degrees from prestigious institutions may have an advantage in securing a teaching job. Some Ph. D.'s may accept temporary, part-time positions as instructors. Others may find research and administrative positions in government, research organizations, and consulting firms. Graduates with training in business administration including management and accounting should have the most favorable job opportunities in business and industry. Persons with a master's degree will continue to face very keen competition for academic positions, although some jobs may be available in junior and community colleges. Some may find research and administrative jobs in government, research firms, and private industry.

Bachelor's degree holders are expected to find very limited opportunities as professional sociologists. However, many graduates are expected to gain positions as trainees in government, business, and industry. For those planning to continue their studies in law, journalism, social work, recreation, counseling, and other related disciplines, sociology provides an excellent background. Some who meet State certification requirements may enter high school teaching.

Sociologists well trained in quantitative research methods, survey methods, advanced statistics, and computer science will have the widest choice of jobs. Demand is expected to be particularly strong for research personnel to work in such areas as urban studies, ethnic studies, race relations, deviant behavior, community development, population analysis, medical sociology, and the sociology of law, work, and education.

Earnings and Working Conditions

According to the 1975-76 College Placement Council Salary Survey, bachelor's degree candidates in the social sciences received offers averaging around $10,000 a year; master's degree candidates in the social sciences, around $12,000.

Salaries of sociologists working in educational institutions and non-academic settings are comparable to those for other social scientists. In general, salaries of experienced sociologists are higher than the average for all nonsupervisory workers in private industry, except farming.

The Civil Service Commission recognizes education and experience in certifying applicants for entry level positions in the Federal Government. In general, the entrance salary for sociologists with a bachelor's degree was $9,303 or $11,523 a year in 1977, depending upon the applicant's academic record. The starting salary for those with a master's degree was $14,097 a year, and for those with a Ph. D., $17,056. Sociologists in the Federal Government work primarily in the Departments of Health, Education, and Welfare; Defense; Agriculture; Interior; Commerce; Transportation; and Housing and Urban Development, as well as the Veterans Administration and Environmental Protection Agency. They averaged around $23,800 in 1977.

In general, sociologists with the Ph. D. degree earn substantially higher salaries than those with master's degrees. Many sociologists, particularly those employed by colleges and universities for the academic year (September to June), supplement their regular salaries with earnings from other sources, such as summer teaching and consulting work.

Sources of Additional Information

Additional information on careers, employment opportunities, and graduate departments of sociology is available from:

The American Sociological Association, 1722 N St., NW., Washington, D.C. 20036.

SOIL CONSERVATIONISTS

(D.O.T. 040.081)

Nature of the Work

Soil conservationist provides farmer with technical assistance.

Soil conservationists provide technical assistance to farmers, ranchers, and others concerned with the conservation of soil and water. They help farmers and other land managers develop programs that make the most productive use of land without damaging it. Soil conservationists do most of their work in the field. If a farmer is experiencing an erosion problem, the conservationist will visit the farm, find the source of the problem, and develop a program to combat the erosion. For example, if the erosion is caused by water runoff on sloped fields, the conservationist may recommend ways to terrace the land, or construct pathways for the runoff that do not remove soil. If erosion results from wind, the conservationist may recommend growing hedges in places that will provide windbreaks or may suggest improved methods of farming, such as leaving the wheat or corn stalks on the field after harvesting to provide ground cover.

In many areas of the country—particularly in the West—rainfall is insufficient to permit the growing of crops. Much of this land, however, can be made suitable for grazing livestock if proper water conservation techniques are used. Soil conservationists inspect rangeland and recommend to range managers areas where ponds can be constructed to provide water for livestock. They also recommend solutions to problems of overgrazing, such as seeding grassland or placing salt licks in undergrazed areas to keep the livestock away from areas that have been overgrazed. In this manner they can distribute herds so that the concentration of animals in any one area does

242

not exceed the replaceable food supply.

Soil conservationists pay close attention to weather patterns in order to be aware of conservation problems before they arise. During the winter months, they make periodic snowmobile or ski patrols into the Rockies and other mountainous areas of the West to measure snowfall. This enables them to predict the spring and summer water runoff. In years when the snowfall is light, they alert range managers and farmers to possible water shortages, and develop appropriate water conservation measures.

In addition to working with individual farmers and ranchers, soil conservationists are assigned to work as technical advisors to Soil and Water Conservation Districts when solving areawide land management problems. A Soil and Water Conservation District is made up of a group of individuals within a county who are concerned with, and responsible for, conservation problems within that county. Soil conservationists working with Conservation Districts prepare maps of the district or parts of the district, depicting particular problems of soil and water conservation. They then use the maps to develop a conservation program for the entire area, whether it is only a few farms and ranches or an entire watershed.

Places of Employment

An estimated 7,500 soil conservationists were employed in 1976, mostly by the Federal Government in the U.S. Department of Agriculture's Soil Conservation Service or in the Department of the Interior's Bureau of Indian Affairs. Soil conservationists employed by the Department of Agriculture work as advisors for Soil and Water Conservation Districts in almost every county in the country. Those employed by the Bureau of Indian Affairs generally work near or on Indian reservations, most of which are located in the Western States. In addition to those who work for the Federal Government, others are employed by State and local governments, and some teach at colleges and universities.

Other soil conservationists are employed by rural banks, insurance firms, and mortgage companies that make loans for agricultural lands. A few also work for public utilities, and lumber and paper companies that have large holdings of forested lands.

Training, Other Qualifications, and Advancement

Very few colleges and universities offer degrees with a major in soil conservation. Most soil conservationists, especially those employed by the Soil Conservation Service, have degrees in agronomy. A few soil conservationists have degrees in related fields of the natural resource sciences, such as wildlife biology, forestry, and agricultural education. Programs of study generally must include 30 semester hours in natural resources or agriculture, including at least 3 hours in soils.

A background in agricultural engineering is very helpful to soil conservationists, and courses in cartography, or mapmaking, also are helpful. Soil conservationists must be able to communicate well with people, since much of their work deals with educating farmers and ranchers in sound conservation practices. Also, they must be able to prepare written reports and plans of programs to present to farmers, range managers, and Soil and Water Conservation Districts.

Opportunities for advancement are somewhat limited. However, conservationists working at the county level may advance to the State level. Also, soil conservationists can transfer to related occupations such as farm management advisor or land appraiser. Those with advanced degrees may find teaching opportunities in colleges and universities.

Employment Outlook

Employment of soil conservationists is expected to increase about as fast as the average for all occupations through the mid-1980's. In addition to employment growth, several hundred openings will occur each year from the need to replace conservationists who die, retire, or transfer to other occupations. For example, even though employment of conservationists in the Soil Conservation Service has not increased over the past decade, the Department of Agriculture has hired, on the average, about 400 new conservationists each year.

Employment growth will occur in banks, public utilities, and other organizations that make loans on agricultural lands or that have large holdings of farm or ranch lands. Many of these organizations are adding conservationists to their staffs to help preserve the value of farmlands on which they hold mortgages or to help them comply with recent conservation and anti-pollution laws. In addition, as concern for the environment and interest in conserving the productivity of agricultural lands increases, a larger number of colleges should add soil conservation majors to their degree programs, which would increase the demand for soil conservationists to fill teaching positions. However, because this is a very attractive job choice for many people, competition for jobs as soil conservationists may make it difficult to find jobs in this field.

Earnings and Working Conditions

Soil conservationists who had a bachelor's degree and were employed by the Federal Government received $9,303 a year in 1977. Advancement to $11,523 could be expected after 1 year of satisfactory service. Those who had outstanding records in college, or who had a master's degree, started at $11,523 and could advance to $14,097 after 1 year. Further advancement depends upon the individual's ability to accept greater responsibility. Earnings of well-qualified Federal soil conservationists with several years' experience range from $17,056 to $28,725 a year.

Because soil conservationists do most of their work in the field, this may be an ideal career for a person who enjoys working outdoors. Usually during periods of bad weather they work in their offices, but occasionally they have to work outdoors in inclement weather.

Sources of Additonal Information

Additional information on employment as a soil conservationist may be obtained from the U.S. Civil Service Commission, Washington, D.C. 20415; Employment Division, Office of Personnel, U.S. Department of Agriculture, Washington, D.C. 20250; or any office of the Department's Soil Conservation Service.

SOIL SCIENTISTS

(D.O.T. 040.081)

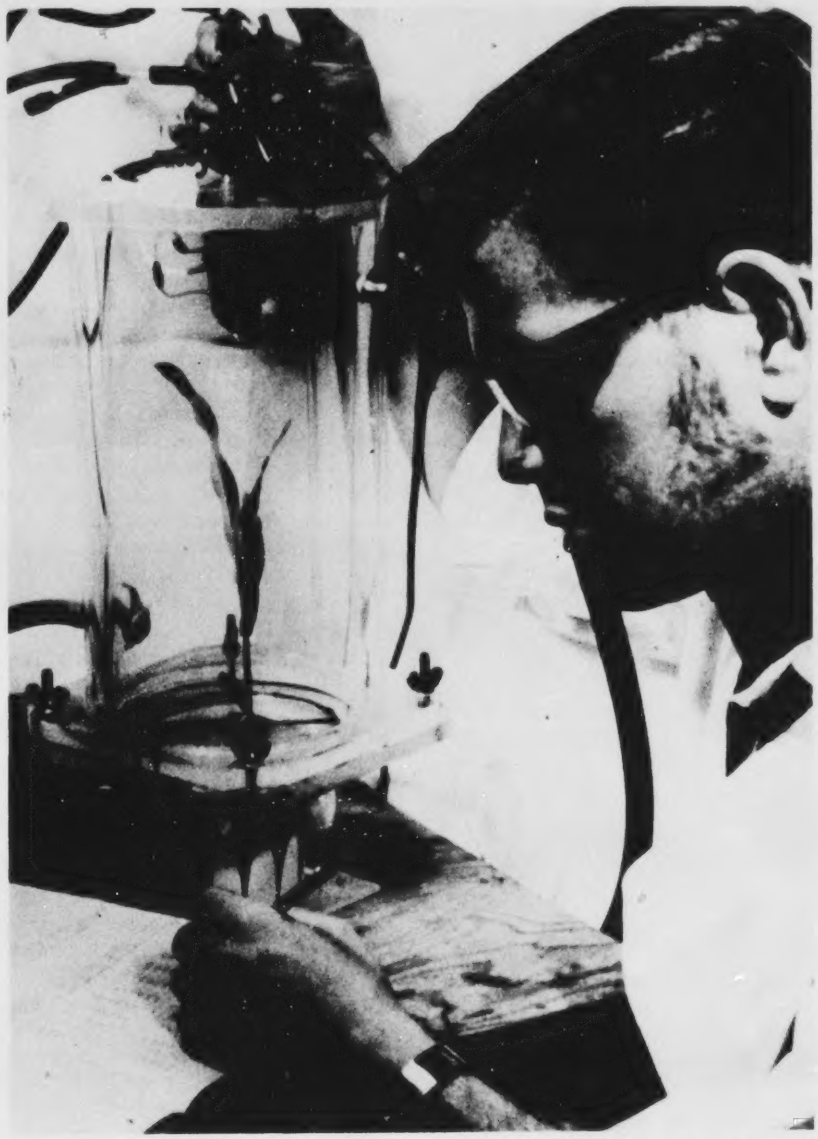
Nature of the Work

Because soil is one of our most valuable resources, it must be used wisely. Soil scientists help to accomplish this by studying the physical, chemical, biological, and behavioral characteristics of soils. A large part of their job is categorizing soils according to a national classification system. To do this, a soil scientist investigates the soils at various places within an area, often taking samples to analyze in the laboratory. Once the soils in an area have been classified, the soil scientist prepares a map, usually based on aerial photographs, which shows soil types throughout the area as well as landscape features, such as streams or hills, and physical features, such as roads or property boundaries.

Because different types of soil are better suited for some uses than others, soil type maps are invaluable tools for urban and regional planners concerned with land use. A planner who may wish to locate large buildings, such as factories or apartment buildings, on a secure base would look for firm soils containing clay. In contrast, sandy soils drain much better than clays, and thus are better suited for uses that require good drainage, such as farming. In addition, a small but increasing number of States require certified soil scientists to examine soils and determine their drainage capacities before issuing building permits for lots on which residences using septic systems are to be built.

Besides the many soil scientists who are employed mapping soils, some conduct research into the chemical and biological properties of soils to determine their agricultural uses. With the assistance of agricultural technicians, they set up experiments in which they grow crops in different types of soils to determine which are most productive for certain crops. They also may test the effects of fertilizers on various types of soils to develop fertilizers adapted to particular soils and to find ways to improve less productive soils. Other soil scientists, who have backgrounds in the biological sciences, may investigate the presence of organic materials in soils and study the effects of these organisms on plant growth.

In recent years, mounting concern over the quality of water has led to research into the causes of pollution and it has been found that sediment, or soil runoff, is responsible for much of the problem. Many States, in an



Most soil scientists work for the Federal Government, State experimental stations, and colleges of agriculture.

244

effort to comply with Federal antipollution laws, now employ soil scientists to inspect large highway and building sites where vegetation has been stripped away, and agricultural lands where fertilizers have been applied, to make sure proper erosion control methods have been followed.

Places of Employment

An estimated 2,500 soil scientists were employed in 1976. Soil scientists work all over the country, in every State and nearly every county. More than half were employed by the Soil Conservation Service of the U.S. Department of Agriculture. Some worked for other agencies of the Federal Government, State agricultural experiment stations, and colleges of agriculture. Others were employed in a wide range of other public and private institutions, including fertilizer companies, private research laboratories, insurance companies, banks and other lending agencies, real estate firms, land appraisal boards, State conservation departments, and farm management agencies. A few are independent consultants, and others work for consulting firms. In addition, some soil scientists worked in foreign countries as research leaders, consultants, and agricultural managers.

Training, Other Qualifications, and Advancement

Training in a college or university is important in obtaining employment as a soil scientist. For Federal employment, the minimum qualification for entrance is a bachelor's degree with a major in soil science or in a closely related field of study, with 30 semester hours of course work in the biological, physical, and earth sciences, including a minimum of 12 semester hours in soils. For students interested in working in the Soil Conservation Service, one of the best courses of study is agronomy, the study of how plants and soils interact. Also, a major in agriculture may enable an applicant to find employment with the Soil Conservation Service. In addition, courses in chemistry and cartography, or mapmaking, are helpful to people interested in this career, and are required by some employers. Soil scientists often must write reports decribing their work and thus need some writing skills.

Soil scientists who have been trained in both field work and laboratory research may have the edge in obtaining the best jobs, and an advanced degree—especially a doctorate degree—may be needed to advance to the more responsible and better paying research jobs. Also, a strong background in chemistry may be necessary for obtaining research positions.

Many colleges and universities offer fellowships and assistantships for graduate training, or employ graduate students for part-time teaching or research.

A few States now require certification of soil scientists who inspect soil conditions prior to construction activities. One such certification program requires candidates for certification to have a bachelor's degree and 3 years of experience as a soil scientist, or a master's degree and 2 years of experience. In addition, candidates must complete a written examination, demonstrating their knowledge of soil science.

Soil scientists often can transfer to related occupations such as land appraiser or farm management advisor.

Employment Outlook

One of the major objectives of the Soil Conservation Service is to complete the soil classification survey of all rural lands in the United States. This program includes soil classification and soil interpretation for use by agriculturists, engineers, and land-use planners. Although the number of soil scientists working on this project has not changed over the past decade, about 100 openings arise each year to replace those scientists who retire, die, or leave the Soil Conservation Service for other reasons.

In addition, some employment growth may be expected in State and local government agencies as concern for pollution and destruction of our soil resources increases. Employment growth also is expected in the private sector of the economy, in businesses such as fertilizer manufacturers, and with lending institutions that make loans for farm lands, such as banks, mortagage companies, and life insurance companies. However, openings for soil scientists may not keep pace with the number of jobseekers in this field.

Earnings and Working Conditions

The incomes of soil scientists depend upon their education, professional experience, and individual abilities. The entrance salary in the Federal service for graduates having a B.S. degree was $9,303 in 1977. They may expect advancement to $11,523 after 1 year of satisfactory performance. Those who had outstanding records in college, or a master's degree, started at $11,523, and could advance to $14,097 after 1 year. Further promotion depends upon the individual's ability to do high quality work and to accept responsibility. Earnings of well-qualified Federal soil scientists with several years of experience ranged from $17,046 to $28,725 a year.

Soil scientists generally spend much of their time doing field work, which requires them to travel within their area—usually within a county. During inclement weather they generally work in an office, preparing maps and writing reports. Researchers spend much of their time doing experiments in fields and greenhouses.

Sources of Additional Information

Additional information may be obtained from the U.S. Civil Service Commission, Washington, D.C. 20415; U.S. Department of Agriculture, Office of Personnel, Washington, D.C. 20250; any office of the Department's Soil Conservation Service; any college of agriculture; the American Society of Agronomy, 677 S. Segoe Rd., Madison, Wis. 53711; or the Soil Society of America, 677 S. Segoe Rd., Madison, Wis. 53711.

See also statements on chemists and life scientists elsewhere in the *Handbook*.

SPEECH PATHOLOGISTS AND AUDIOLOGISTS

(D.O.T. 079.108)

Nature of the Work

About one out of ten Americans is unable to speak or hear clearly. Children who have trouble speaking or hearing cannot participate fully with other children in play or in normal classroom activities. Adults having speech or hearing impairments often have problems in job adjustment. Speech pathologists and audiologists provide direct services to these people by evaluating their speech or hearing disorders and then providing treatment.

The speech pathologist works with children and adults who have speech, language, and voice disorders resulting from causes such as total or partial hearing loss, brain injury, cleft palate, mental retardation, emotional problems, or foreign dialect. The audiologist primarily assesses and treats hearing problems. Speech and hearing, however, are so interrelated that, to be competent in one of these fields, one must be familiar with both.

The duties of speech pathologists and audiologists vary with education, experience, and place of employment. In clinics, either in schools or other locations, they use diagnostic procedures to identify and evaluate speech and hearing disorders. Then, in cooperation with physicians, psychologists, physical therapists, and counselors, they develop and implement an organized program of therapy. Some speech pathologists and audiologists conduct research such as investigating the causes of communicative disorders and improving methods for clinical services. Others supervise clinical activities.

Speech pathologists and audiologists in colleges and universities teach courses in the principles of communication, communication disorders, and clinical techniques; participate in educational programs for physicians, nurses, and teachers; and work in university clinics and research centers. Although most speech pathologists and audiologists do some administrative work, directors of speech and hearing clinics and coordinators of speech and hearing in schools, health departments, or government agencies may be totally involved in administration.

Speech pathologists and audiologists help people overcome speech and hearing disorders.

Places of Employment

Over 38,000 persons worked as speech pathologists and audiologists in 1976. Over one-half worked in public schools. Colleges and universities employed many in classrooms, clinics, and research centers. The rest worked in hospitals, speech and hearing centers, government agencies, industry, and private practice.

Training, Other Qualifications, and Advancement

An increasing number of States require a master's degree or its equivalent for speech pathologists and audiologists. In addition, many Federal programs, such as Medicare and Medicaid, require participating speech pathologists and audiologists to have a master's degree. Some States require a teaching certificate to work in the public schools. In 29 States, those offering speech pathology and audiology services outside of schools must be licensed. Licensure requirements vary among the States.

Undergraduate courses in speech pathology and audiology programs include anatomy, biology, physiology, physics, sociology, linguistics, semantics, and phonetics. Courses in speech and hearing as well as in child psychology and psychology of the exceptional child also are helpful. This training usually is available at colleges that offer a broad liberal arts program.

In early 1977, about 228 colleges and universities offered graduate education in speech pathology and audiology. Courses at the graduate level include advanced anatomy and physiology of the areas involved in hearing and speech; acoustics; psychological aspects of communication; and analysis of speech production, language abilities, and auditory processes. Graduate students also take courses in the evaluation and remediation of speech, language, and hearing disorders. All students at the graduate level receive supervised clinical training with clients having communicative disorders.

A limited number of scholarships, fellowships, assistantships, and traineeships are available in this field. Teaching and training grants to colleges and universities that have programs in speech and hearing are given by a number of agencies of the U.S. Department of Health, Education, and Welfare—the Rehabilitation Services Administration, the Maternal and Child Health Service, the Office of Education, and the National Institutes of Health. In addition, some Federal agencies distribute money to colleges to aid graduate students in speech and hearing programs. A large number of private organizations and foundations also provide financial assistance for education in this field.

Meeting the American Speech and Hearing Association's (ASHA) requirements for a Certificate of Clinical Competence usually is necessary in order to advance professionally and to earn a higher salary. To earn the CCC, a person must have a master's degree or its equivalent and complete a one-year internship approved by the Association. Passing a national written examination also is required.

Speech pathologists and audiologists should be able to approach problems objectively and have a concern for the needs of others. They also should have considerable patience, because a client's progress often is slow. A person who desires a career in speech pathology and audiology should be able to accept responsibility, work independently, and direct others. The ability to work with detail is important. Speech pathologists and audiologists receive satisfaction from seeing clients' speech or hearing improve as a result of their work.

Employment Outlook

The employment of speech pathologists and audiologists is expected to increase faster than the average for all other occupations through the mid-1980's. However, temporary reductions in government spending on speech and hearing programs may decrease the number of new positions available at any one time. Although some jobs will be available for those having only a bachelor's degree, the increasing emphasis placed on the master's degree by State governments, school systems, and Federal agencies will limit opportunities at the bachelor's degree level.

While employment opportunities for those with a master's degree generally should be favorable, the large number of graduates entering this field may cause some competition. Many openings will occur outside of the large metropolitan areas and some graduates will have to relocate in order to find employment. Competition for teaching positions in colleges and universities will be very strong throughout the period.

Population growth, which will increase the number of persons having speech and hearing problems, is one of the factors underlying the expected expansion in employment of speech pathologists and audiologists through the mid-1980's. In addition, there is a trend toward earlier recognition and treatment of hearing and language problems in children. Many school-age children, thought to have learning disabilities, actually have language or hearing disorders which speech pathologists and audiologists can treat.

Other factors expected to increase demand for speech pathologists and audiologists are expansion in expenditures for medical research and the growing public interest in speech and hearing disorders. State and Federal laws now require school systems to provide equal educational services for handicapped children, and Medicare and Medicaid programs have expanded their coverage of speech and hearing services.

Earnings and Working Conditions

In 1977, the annual starting salary in the Federal Government for speech pathologists and audiologists with a master's degree was $14,097. Those having a doctoral degree were eligible to start at $17,056. The average salary of all speech pathologists and audiologists working for the Federal Government was $21,804.

Salaries of speech pathologists outside of government tend to be higher in areas having large urban populations. Many speech pathologists and audiologists, particularly those in colleges and universities, supplement their incomes by acting as consultants, engaging in research projects, and writing books and articles.

Many speech pathologists and audiologists work over 40 hours a week. Almost all receive fringe benefits such as paid vacations, sick leave, and retirement programs.

Sources of Additional Information

State departments of education can supply information on certification requirements for those who wish to work in public schools.

A list of college and university programs and a booklet on student financial aid as well as general career information are available from:

American Speech and Hearing Association,
9030 Old Georgetown Rd., Washington,
D.C. 20014.

STATE POLICE OFFICERS

(D.O.T. 375.118, .138, .168, .228, .268, and .388)

Nature of the Work

The laws and regulations that govern the use of our Nation's roadways are designed to insure the safety of all citizens. State police officers (sometimes called State troopers) patrol our highways and enforce these laws.

State police officers issue traffic tickets to motorists who violate the law. At the scene of an accident, they direct traffic, give first aid, call for emergency equipment including ambulances, and write reports to be

STATE
POLICE

State police officers usually take care of vehicle and traffic matters on the State's highways.

used in determining the cause of the accident.

In addition, State police officers provide services to motorists on the highways. For example, they radio for road service for drivers with mechanical trouble, direct tourists to their destination, or give information about lodging, restaurants, and tourist attractions.

State police officers also provide traffic assistance and control during road repairs, fires, and other emergencies, as well as during special occurrences such as parades and sports events. They sometimes check the weight of commercial vehicles, conduct driver examinations, and give information on highway safety to the public.

In addition to highway responsibilities, State police may investigate crimes, particularly in areas that do not have a local police force. They sometimes help city or county police catch lawbreakers and control civil disturbances. State highway patrols, however, normally are restricted to vehicle and traffic matters.

Some officers work with special State police units such as the mounted police, canine corps, and marine patrols. Others instruct trainees in State police schools, pilot police aircraft, or specialize in fingerprint classification or chemical and microscopic analysis of criminal evidence.

State police officers also write reports and maintain police records. Some officers, including division or bureau chiefs responsible for training or investigation and those who command police operations in an assigned area, have administrative duties.

Places of Employment

About 48,000 State police officers were employed in 1976.

The size of State police forces varies considerably. The largest force (in California) has over 5,000 officers; the smallest (in North Dakota) has fewer than 100. One State (Hawaii) does not maintain a police force.

Training, Other Qualifications, and Advancement

State civil service regulations govern the appointment of State police officers. All candidates must be citizens of the United States. Other entry requirements vary, but most States require that applicants have a high school education or an equivalent combination of education and experience and be at least 21 years old.

Officers must pass a competitive examination and meet physical and personal qualifications. Physical requirements include standards of height, weight, and eyesight. Tests of strength and agility often are required. Because honesty and a sense of responsibility are important in police work, an applicant's character and background are investigated.

Although State police officers work independently, they must perform their duties in line with department rules. They should want to serve the public and be willing to work outdoors in all types of weather.

In all States, recruits enter a formal training program for several months. They receive classroom instruction in State laws and jurisdictions, and they study procedures for accident investigation, patrol, and traffic control. Recruits learn to handle firearms, defend themselves from attack, handle an automobile at high speeds, and give first aid. After gaining experience, some officers take advanced training in police science, administration, law enforcement, or criminology. Classes are held at junior colleges, colleges and universities, or special police institutions such as the

National Academy of the Federal Bureau of Investigation.

High school and college courses in English, government, psychology, sociology, American history, and physics help in preparing for a police career. Physical education and sports are useful for developing stamina and agility. Driver education courses and military police training also are helpful.

Police officer recruits serve a probationary period ranging from 6 months to 3 years. After a specified length of time, officers become eligible for promotion. Most States have merit promotion systems that require officers to pass a competitive examination to qualify for the next highest rank. Although the organization of police forces varies from State to State, the typical avenue of advancement is from private to corporal, to sergeant, to first sergeant, to lieutenant, and then to captain.

In some States, high school graduates may enter State police work as cadets. These paid civilian employees of the police organization attend classes to learn various aspects of police work and are assigned nonenforcement duties. Cadets who qualify may be appointed to the State police force at age 21.

Employment Outlook

State police employment is expected to grow about as fast as the average for other occupations. Although most jobs will result from this growth, some openings will be created as officers retire, die, or leave the occupation for other reasons.

Although some State police will be needed in criminal investigation and other nonhighway functions, the greatest demand will be for officers to work in highway patrol. This is the result of a growing, more mobile population. In ever-increasing numbers, Americans are using the motor vehicle as a means of transportation and a source of recreation. Motorcycles, campers, and other recreational vehicles will continue to add to the Nation's traffic flow and require additional officers to insure the safety of highway users.

Because law enforcement work is becoming more complex, specialists will be needed in crime laboratories and electronic data processing centers to develop administrative and criminal information systems. However, in many departments, these jobs will be filled by civilian employees rather than uniformed officers.

Earnings and Working Conditions

In 1976, beginning salaries for State police officers averaged about $10,400 a year. Officers generally receive regular salary increases, based on experience and performance, until a specified maximum is reached. Maximum salaries averaged $13,600 a year in 1976, but ranged to more than $15,000 a year in some States. Although starting salaries are normally higher in the West and lower in the South, State police officers on the average earn about 1 1/2 times as much as nonsupervisory workers in private industry, except farming.

Earnings increase with promotions to higher ranks. State police sergeants received average starting salaries of $12,350 a year in 1976, and average maximum salaries of close to $15,800. Lieutenants received average starting salaries of $14,200 a year and average maximum salaries of more than $18,300.

State police agencies usually provide officers with uniforms, firearms, and other necessary equipment, or give special allowances for their purchase.

In many States, the scheduled workweek for police officers is 40 hours. Although the workweek is longer in some States, the trend is toward a 40-hour week. Since police protection must be provided around the clock, some officers are on duty over weekends, on holidays, and at night. Police officers also are subject to emergency calls at any time.

State police usually are covered by liberal pension plans. Paid vacations, sick leave, medical insurance, and life insurance plans frequently are provided.

The work of State police officers is sometimes dangerous. They always run the risk of an automobile accident while pursuing speeding motorists or fleeing criminals. Officers also face the risk of injury while apprehending criminals or controlling disorders.

Sources of Additional Information

Information about specific entrance requirements may be obtained from State civil service commissions or State police headquarters, usually located in each State capital.

STATISTICIANS

(D.O.T. 020.188)

Nature of the Work

Statistics are numbers that help describe the characteristics of the world and its inhabitants. Statisticians devise, carry out, and interpret the numerical results of surveys and experiments. In doing so, they apply their knowledge of statistical methods to a particular subject area, such as economics, human behavior, natural science, or engineering. They may use statistical techniques to predict population growth or economic conditions, develop quality control tests for manufactured products, or help business managers and government officials make decisions and evaluate the results of new programs.

Often statisticians are able to obtain accurate information about a group of people or things by surveying a small portion, called a sample, rather than the whole group. For example, television rating services ask only a few thousand families, rather than all viewers, what programs they watch to determine the size of the audience. Statisticians decide where to get the data, determine the type and size of the sample group, and develop the survey questionnaire or reporting form. They also prepare instructions for workers who will tabulate the returns. Statisticians who design experiments prepare mathematical models to test a particular theory. Those in analytical work interpret collected data and summarize their findings in tables, charts, and written reports. Some statisticians,

Statisticians devise, carry out, and interpret the numerical results of surveys and experiments.

called mathematical statisticians, use mathematical theory to design and improve statistical methods.

Because the field of statistics has such a wide application, it sometimes is difficult to distinguish statisticians from specialists in other fields who use statistics. For example, a statistician working with data on economic conditions may have the title of economist.

Places of Employment

Approximately 24,000 persons worked as statisticians in 1976. About two out of three statisticians were in private industry, primarily in manufacturing, public utilities, finance, and insurance companies. Roughly one-eighth worked for the Federal Government, primarily in the Departments of Commerce; Health, Education, and Welfare; Agriculture; and Defense. Others worked in State and local government and colleges and universities.

Although statisticians work in all parts of the country, most are in metropolitan areas, and about one-fourth work in three areas—New York City; Washington, D.C.; and Los Angeles-Long Beach, California.

Training, Other Qualifications, and Advancement

A bachelor's degree with a major in statistics or mathematics is the minimum educational requirement for many beginning jobs in statistics. For other beginning statistical jobs, however, a bachelor's degree with a major in an applied field such as economics or natural science and a minor in statistics is preferable. A graduate degree in mathematics or statistics is essential for college and university teaching. Most mathematical statisticians have at least a bachelor's degree in mathematics and an advanced degree in statistics.

About 145 colleges and universities offered statistics as a concentration for a bachelor's degree in 1976. Many schools also offer either a degree in mathematics or a sufficient number of courses in statistics to qualify graduates for beginning positions. Required subjects for statistics majors include mathematics through differential and integral calculus, statistical methods, and probability theory. Courses in computer uses and techniques, if not required, are highly recommended. For quality control positions, training in engineering or a physical or biological science and in the application of statistical methods to manufacturing processes is desirable. For many market research, business analysis, and forecasting jobs, courses in economics and business administration are helpful.

Over 100 colleges and universities offered graduate degrees in statistics in 1976, and many other schools offered one or two graduate level statistics courses. Acceptance into graduate programs does not require an undergraduate degree in statistics although a good mathematics background is essential.

Beginning statisticians who have only the bachelor's degree often spend much of their time performing routine work under the supervision of an experienced statistician. Through experience, they may advance to positions of greater technical and supervisory responsibility. However, opportunities for promotion are best for those with advanced degrees.

Employment Outlook

Employment opportunities for persons who combine training in statistics with knowledge of a field of application are expected to be favorable through the mid-1980's. Besides the faster than average growth expected in this field, additional statisticians will be needed to replace those who die, retire, or transfer to other occupations.

Private industry will require increasing numbers of statisticians for quality control in manufacturing. Statisticians with a knowledge of engineering and the physical sciences will find jobs working with scientists and engineers in research and development. Business firms will rely more heavily than in the past on statisticians to forecast sales, analyze business conditions, modernize accounting procedures, and help solve management problems.

Many fields such as law and history are discovering the usefulness of statistics. As the use of statistics expands into new areas, more statisticians will be needed to apply their special knowledge.

Federal, State, and local government agencies will need statisticians for existing and new programs in fields such as social security, health, and education. Colleges and universities will employ others to teach a growing number of students, as the broader use of statistical methods makes such courses increasingly important to persons majoring in fields other than mathematics and statistics.

Earnings and Working Conditions

In the Federal Government in 1977, statisticians who had the bachelor's degree and no experience could start at either $9,303 or $11,523 a year, depending on their college grades. Beginning statisticians with the master's degree could start at $14,097 or $17,056. Those with the Ph. D. could begin at $17,056 or $20,442. The average annual salary for statisticians in the Federal Government was $24,000 in 1977.

Salaries in private industry were comparable to those in the Federal Government, according to the limited data available.

Statisticians employed by colleges and universities generally receive salaries comparable to those paid other faculty members. (See statement on college and university teachers.) In addition to their regular salaries, statisticians in educational institutions sometimes earn extra income from outside research projects, consulting, and writing.

Sources of Additional Information

For information about career opportunities in statistics, contact:

American Statistical Association, 806 15th St. NW., Washington, D.C. 20005.

Facts on Federal Government jobs are available from:

Interagency Board of U.S. Civil Service Examiners for Washington, D.C., 1900 E St. NW., Washington, D.C. 20414.

For information on a career as a mathematical statistician, contact:

Institute of Mathematical Statistics, 1367 Laurel St., San Carlos, Calif. 94070.

SURVEYORS

(D.O.T. 018.188)

Nature of the Work

Before engineers can plan highways or other construction projects, they need complete and accurate information about boundaries, land features, and other characteristics of the construction site. Surveyors measure construction sites, help establish official land boundaries, assist in setting land valuations, and collect information for maps and charts.

Surveyors often work as party chiefs; that is, they are in charge of a field party that determines the precise measurements and locations of elevations, points, lines, and contours on the earth's surface, and distances between points. Surveyors are directly responsible for the field party's activity and the accuracy of its work. They plan the field work, select survey reference points, and determine the precise location of natural and manmade features of the survey region. They record the information disclosed by the survey, verify the accuracy of the survey data, and prepare sketches, maps, and reports.

A typical field party is made up of the party chief and three to six assistants and helpers. *Instrument workers* (D.O.T. 018.188) adjust and operate surveying instruments such as the theodolite (used to measure altitude) These workers also compile notes, sketches, and records of the data obtained from using these instruments. *Chain workers* (D.O.T. 018.687) use a steel tape or surveyor's chain to measure distances between surveying points. Generally chain workers operate in pairs, one holding the tape at the last established point, and the other marking an advanced measuring point. Chain workers also may mark measured points with painted stakes. *Rod workers* (D.O.T. 018.587) use a level rod, range pole, or other equipment to assist instrument workers in determining elevations, distances, and directions. They hold and move the range pole according to hand or verbal signals of the instrument worker to help establish the exact point of measurement. Rod workers also may clear brush from the survey line.

Surveyors often specialize in a particular type of survey. Besides doing *highway surveys*, many perform *land surveys* to locate boundaries of a particular tract of land. They then prepare maps and legal descriptions for deeds, leases, and other documents. Surveyors doing *topographic surveys* determine elevations, depressions, and contours of an area, and indicate the location of distinguishing surface features such as farms, buildings, forests, roads, and rivers. Other specialties include mining, pipeline, gravity, and magnetic surveying.

Surveyors doing topographic surveys to determine elevations, depressions, and contours of an area.

Several closely related occupations are geodesy and photogrammetry. Geodesists measure immense areas of land, sea, or space by taking into account the earth's curvature and its geophysical characteristics. (See statement on geophysicists elsewhere in the *Handbook*.) Photogrammetrists measure and interpret photographic images to determine the various physical characteristics of natural or manmade features of an area. By applying analytical processes and mathematical techniques to photographs obtained from aerial, space, ground, and underwater locations, photogrammetrists are able to make detailed maps of areas that are inaccessible or difficult to survey by other methods. Control surveys on the ground are made to determine the accuracy of maps derived from photogrammatic techniques.

Places of Employment

About 52,000 persons worked as surveyors in 1976. Federal, State, and local government agencies employ about 3 out of every 10 surveyors. Among the Federal Government agencies employing these workers are the U.S. Geological Survey, the Bureau of Land Management, the Army Corps of Engineers, and the Forest Service. Most surveyors in State and local government agencies work for highway departments and urban planning and redevelopment agencies.

A large number of surveyors work for construction companies and for engineering and architectural consulting firms. A sizable number either work for or own firms that conduct surveys for a fee. Significant numbers of surveyors also work for crude petroleum and natural gas companies, and for public utilities.

Training, Other Qualifications, and Advancement

Most persons prepare for surveying work by combining postsecondary school courses in surveying and extensive on-the-job training. Some prepare by obtaining a college degree. Junior and community colleges, technical institutes, and vocational schools offer 1-, 2-, and 3-year programs in surveying. A few 4-year colleges offer bachelor's degrees specifically in surveying, while many others offer several courses in the field.

High school students interested in pursuing a career in surveying should take courses in algebra, geometry, trigonometry, drafting, and mechanical drawing.

High school graduates with no formal training in surveying usually start as rod workers. After several years of on-the-job experience and some formal training in surveying, it is possible to advance to chain worker, instrument worker, and finally to party chief.

Beginners with postsecondary school training in surveying can generally start as instrument workers. After gaining experience, they usually advance to party chief, and may later seek to become a registered surveyor. In many instances, promotions to higher level positions are based on written examinations as well as experience.

For those interested in a career as a photogrammetrist, a bachelor's degree in engineering or the physical sciences is usually needed. Most photogrammetry technicians have had some specialized postsecondary school training.

All 50 States require licensing or registration of land surveyors responsible for locating and describing land boundaries. Registration requirements are generally quite strict, because once registered, surveyors can be held legally responsible for their work. Requirements for licensure vary among the States but in general they include a combination of 3 to 8 years' experience in surveying and passing an examination. A few States now require a bachelor's degree, emphasizing surveying, as a prerequisite to licensure.

In 1976, about 23,000 land surveyors were registered. In addition, about 13,500 engineers were registered to do land surveying, primarily as part of their civil engineering duties; however, these workers are considered engineers rather than surveyors. (See statement on civil engineers elsewhere in the *Handbook*.)

Surveyors should have the ability to visualize and understand objects, distances, sizes, and other abstract forms. Also, because surveying mistakes can be very costly, surveyors must perform mathematical calculations quickly and accurately while paying close attention to the smallest detail. Leadership qualities also are important as surveyors must supervise the work of others.

Members of a survey party must be in good physical condition in order to work outdoors and carry equipment over difficult terrain. They also need good eyesight, coordination, and hearing in order to communicate over great distances by hand signals or voice calls.

Employment Outlook

Employment of surveyors is expected to grow faster than the average for all occupations through the mid-1980's. In addition to the openings resulting from growth, many will result from the need to replace those who die, retire, or transfer to other fields of work.

The rapid development of urban areas and increased land values should create jobs for surveyors to locate boundaries for property records. Others will be needed to lay out streets, shopping centers, housing developments, and recreation areas. Construction and improvement of the Nation's roads and highways also will require many new surveyors. However, periods of slow construction activity could limit the demand for surveyors at those particular times.

Continuing expansion of technician and technology programs in postsecondary schools will create a need for more surveying teachers.

Earnings and Working Conditions

In the Federal Government in 1977, high school graduates with little or no training or experience started as rod workers or chain workers with an annual salary of $6,572. Those with 1 year of related postsecondary training earned $7,408. Those with an associate degree that included courses in surveying generally started as instrument workers with an annual salary of $8,316. The majority of surveyors who worked as party chiefs in the Federal Government earned between $10,000 and $14,000 per year and some high-level positions earned more than $17,000 per year.

Although salaries in private industry vary by geographic area, limited data indicate that salaries are generally comparable to those in Federal service and are above the average earnings of nonsupervisory workers in private industry, except farming.

Surveyors usually work an 8-hour, 5-day week. However, they sometimes work longer hours during the summer months when weather conditions are most suitable for surveying. The work of surveyors is active and sometimes strenuous. They often stand for long periods and walk long distances or climb hills with heavy packs of instruments and equipment. Because most work is out-of-doors, surveyors are exposed to all types of weather. Some duties, such as planning surveys, preparing reports and computations, and drawing maps, usually are done in an office.

Sources of Additional Information

Information about training and career opportunities in surveying is available from:

American Congress on Surveying and Mapping, 210 Little Falls St., Falls Church, Va. 22046.

General information on careers in photogrammetry is available from:

American Society of Photogrammetry, 105 North Virginia Ave., Falls Church, Va. 22046.

SYSTEMS ANALYSTS

(D.O.T. 003.187, 012.168, 020.081 and 020.088)

Nature of the Work

Many essential business functions and scientific research projects depend on systems analysts to plan efficient methods of processing data and handling the results. Analysts begin an assignment by discussing the data processing problem with managers or specialists to determine the exact nature of the problem and to break it down into its component parts. If a new inventory system is desired, for example, systems analysts must determine what new data need to be collected, the equipment needed for computation, and the steps to be followed in processing the information.

Analysts use various techniques, such as cost accounting, sampling, and mathematical model building to analyze a problem and devise a new system. Once a system has been developed, they prepare charts and diagrams that describe its operation in terms that managers or customers can understand. They also may prepare a cost-benefit analysis to help the client decide whether the proposed system is satisfactory.

If the system is accepted, systems analysts translate the logical requirements of the system into the capabilities of the computer machinery or "hardware." They also prepare specifications for programmers to follow and work with them to "debug," or eliminate errors from the system. (The job of the computer programmer is described elsewhere in the *Handbook*.)

The problems systems analysts must solve range from monitoring nuclear fission in a powerplant to forecasting sales for an appliance manufacturing firm. Because the work is so varied and complex, analysts specialize in either business or scientific and engineering applications.

Some analysts improve systems already in use by developing better procedures or adapting the system to handle additional types of data. Others do research, called advanced systems design, to devise new methods of systems analysis.

Places of Employment

About 160,000 persons worked as systems analysts in 1976. Employment of these workers is concentrated in two geographic regions—more

System analysts devising a new system.

than one-third of the total are employed in the Midwest and about one-fourth work in the northeastern portion of the United States. Most systems analysts worked in urban areas for manufacturing firms, banks, insurance companies, and data processing service organizations. In addition, large numbers worked for wholesale and retail businesses and government agencies.

Training, Other Qualifications, and Advancement

There is no universally acceptable way of preparing for a job as a systems analyst because employers' preferences depend on the work being done. However, college graduates generally are sought for these jobs, and for some of the more complex jobs, persons with graduate degrees are preferred. Employers usually want analysts with a background in accounting, business management, or economics for work in a business environment while a background in the physical sciences, mathematics, or engineering is preferred for work in scientifically oriented organizations. A growing number of employers seek applicants with a degree in computer science, information science, or data processing. Regardless of college major, most employers look for people who are familiar with programming languages. Courses in computer concepts, systems analysis, and data retrieval techniques offer good preparation for a job in this field.

Prior work experience is important. Nearly half of all persons entering this occupation have transferred from other occupations, especially from computer programmer. In many industries, all systems analysts begin as programmers and are promoted to analyst positions after gaining experience.

Systems analysts must be able to think logically and should like working with ideas. The ability to concentrate and pay close attention to details also is important. Although most systems analysts work independently, they sometimes work in teams on large projects. They must be able to communicate effectively with technical personnel such as programmers as well as with clients who have no computer background.

In order to advance, systems analysts must continue their technical education. Technological advances come so rapidly in the computer field that continuous study is necessary to keep one's skills up to date. Training usually takes the form of 1-and 2-week courses offered by employers and software vendors.

An indication of experience and professional competence is the Certificate in Data Processing (CDP). This designation is conferred by the Institute for Certification of Computer Professionals upon candidates who have completed 5 years' experience and passed a five-part examination.

In large data processing departments, persons who begin as junior systems analysts may be promoted to senior or lead systems analysts after several years of experience. Systems analysts who show leadership ability also can advance to jobs as managers of systems analysis or data processing departments.

Employment Outlook

Employment of systems analysts is expected to grow faster than the average for all occupations through the mid-1980's as computer usage expands, particularly in accounting firms and organizations engaged in research and development. In addition to opportunities that will result from growth, some openings will occur as systems analysts advance to managerial positions or enter other occupations. Because many of these workers are relatively young, few positions will result from retirement or death.

The demand for systems analysts is expected to rise as computer capabilities are increased and computers are used to solve problems in a larger variety of areas. Sophisticated accounting systems, telecommunications networks, and complex mathematical systems used in scientific research are examples of new approaches in problem-solving. Over the next decade, we can expect systems analysts to be harnessing the computer's resources to solve problems we have not yet recognized. Advances in technology that have drastically reduced the size and cost of computer hardware will have differing effects on employment of systems analysts. Employment in data processing firms may not grow as rapidly as in recent years as more small businesses install their own computer rather than rely on a data processing service. This will be offset, however, by a rising demand for analysts to design systems especially for the small computer and geared specifically for the problems of small firms.

The outlook for graduates of computer-related curriculums should be excellent. College graduates who have had courses in computer programming, systems analysis, and other data processing areas should also find many opportunities. Persons without a college degree and college graduates unfamiliar with data processing may face competition from the large number of experienced workers seeking jobs as systems analysts.

Earnings and Working Conditions

Earnings for beginning systems analysts in private industry averaged $250 a week in 1976, according to surveys conducted in urban areas by the Bureau of Labor Statistics and private firms engaged in research on computer occupations. Experienced workers earned from $340 to $380, and lead systems analysts earned from $385 to $400 weekly. Overall, systems analysts earn well over twice as much as the average for all nonsupervisory workers in private industry, except farming.

In the Federal Government, the entrance salary for recent college graduates was about $180 a week in 1977. Salaries for systems analysts at all levels of responsibility generally are comparable to those in private industry.

Systems analysts working in the North and West earned somewhat more than those in the South and generally their earnings were greater in data processing service firms or in heavy manufacturing than in insurance companies or educational institutions.

Systems analysts usually work about 40 hours a week—the same as other professional and office workers. Unlike many computer operators, systems analysts are not assigned to evening or night shifts. Occasionally, however, evening or weekend work may be necessary to complete emergency projects.

Sources of Additional Information

Further information about the occupation of systems analyst is available from:

American Federation of Information Processing Societies, 210 Summit Ave., Montvale, N.J. 07645.

Association for Systems Management, 24587 Bagley Rd., Cleveland, Ohio 44138.

Information about the Certificate in Data Processing is available from:

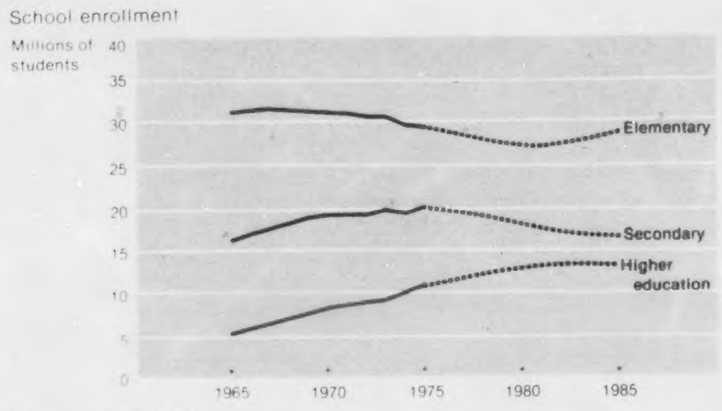
The Institute for Certification of Computer Professionals, 35 E. Wacker Dr., Suite 2828, Chicago, Ill. 60601.

TEACHERS

Most people would agree that education is a life-long process. At every age we learn from our friends, family, and associates. We also teach others along the way, often unwittingly. But perhaps our most influential educational experiences occur during the years of formal education. During those years, students explore themselves and learn about many subjects. They make career decisions and train for productive work. Most significantly, they learn to think for themselves.

Today, more than 3 million teachers are involved at all levels of this educational process. Teachers work with people of all ages in a variety of different subjects. Some teach youngsters in their first years away from home, while others work primarily with adults who are taking courses to expand or change their job potential, or as a source of recreation. Some teachers are members of other professions who instruct part time.

Detailed information on teaching occupations and the outlook for teachers through the mid-1980's is presented in the following statements.



Changing enrollment levels will be the primary factors affecting employment of teachers through 1985

Source: National Center for Educational Statistics

KINDERGARTEN AND ELEMENTARY SCHOOL TEACHERS

(D.O.T. 092.228)

Nature of the Work

Kindergarten and elementary school teachers play a vital role in the development of children. What is learned or not learned in these early years can, to a large measure, shape students views of themselves, the world and the process of education.

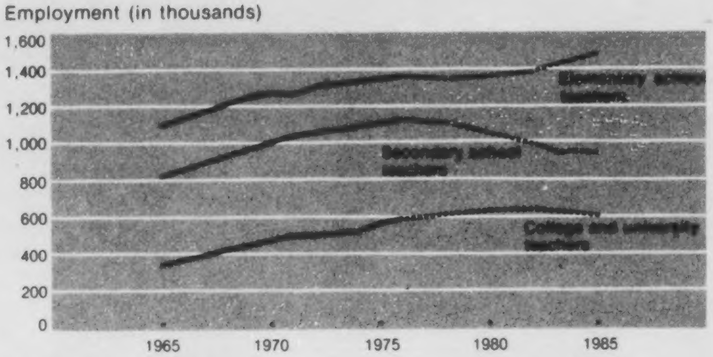
Kindergarten and elementary school teachers must introduce children to the basic concepts of mathematics, language, science, and social studies to provide a sound foundation for more advanced study in the higher grades. They also try to instill in the students good study and work habits and an appreciation for learning while closely watching and evaluating each child's performance and potential.

Elementary school teachers often devise creative means to present a specific subject matter. They may use films, slides, computers, or develop instructional games. They also arrange class trips, speakers, and class projects. All of this work involves much time and effort, often after the regular school day is finished.

Teachers also are concerned with the social development and health of their students. They study each child's interactions with his or her classmates and discuss any problems with the parents. Teachers may, for example, meet with the parents of a child who habitually resists authority to discover the causes of these actions and work out a solution. Teachers also report any possible health problems to parents and school health officials. The teacher's primary concern is to insure that each child receives as much personalized help as required.

Most elementary school teachers instruct a single group of children in several subjects. In some schools, two teachers or more "team teach" and are jointly responsible for a group of students or for a particular subject. An increasing number of elementary school teachers specialize in

Employment of teachers generally will follow enrollment trends, rising or falling according to the number of students through 1985



Source: National Center for Educational Statistics

one or two subjects and teach these subjects to several classes. Some teach special subjects such as music, art, or physical education, while others teach basic subjects such as English, mathematics, or social studies.

Teachers participate in many activities outside the classroom. They generally must attend regularly scheduled faculty meetings and may serve on faculty committees, such as those to revise curricula, or to evaluate the school's objectives and the student's performance. Teachers also may supervise after-school activities such as glee clubs, drama clubs, or arts and crafts classes. To stay up-to-date on educational materials and teaching techniques, they participate in workshops and other inservice activities, and take courses at local colleges and universities.

A growing number of elementary school teachers have aides to do secretarial work and help supervise lunch and playground activities. As a result, teachers can be free from routine duties to give more individual attention to students.

Places of Employment

About 1.4 million people worked as elementary school teachers in 1976. Most elementary teachers work in public schools that have six grades; however, some teach in middle schools—schools that cover the 3 or 4 years between the lower elementary grades and 4 years of high school. Only about 13 percent of elementary school teachers work in nonpublic schools.

A large proportion of all public elementary school teachers teach in urban areas, including cities and their suburbs.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public elementary school teachers to be certified by the department of education in the State in which they work. Some States also require teachers in private and parochial schools to be certified.

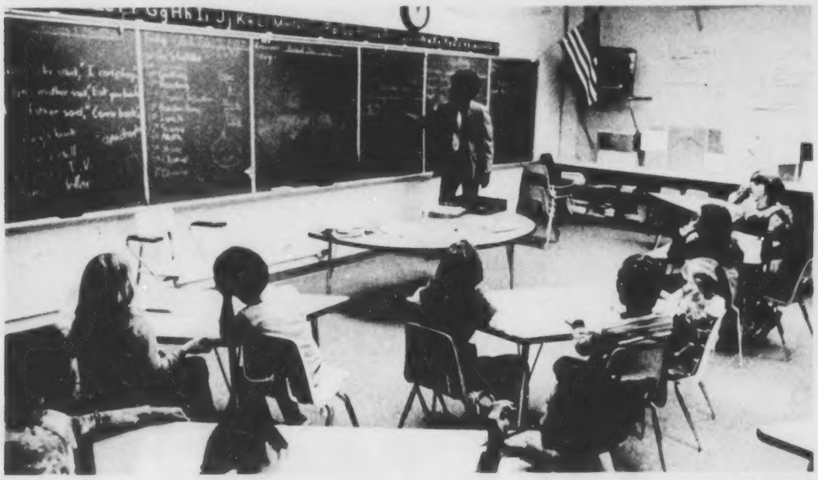
To qualify for certification, a teacher must have a bachelor's degree from an institution with an approved teacher education program. Besides a bachelor's degree, which provides the necessary liberal arts background, States require that prospective teachers have student-teaching and other education courses.

In 1976, 14 States required teachers to get supplementary postgraduate education—usually a master's degree or a fifth year of study—after their initial certification. Some States required U.S. citizenship; some an oath of allegiance; and several a health certificate.

Local school systems sometimes have additional requirements for employment. Students should write to the local superintendent of schools and to the State department of education for information on specific requirements in the area where they want to teach.

In addition to meeting educational and certification requirements, teachers should be creative, dependable, and patient. Most important, they should want to be directly involved in the educational and emotional development of children. Competence in handling classroom situations also is important.

As a teacher gains experience, he or she may advance within a school



Most elementary school teachers instruct a single group of children in several subjects.

system or transfer to another which recognizes experience and has a higher salary scale. Some teachers may advance to supervisory, administrative, or specialized positions. Often, however, these positions require additional training and certification. As a result, for most teachers, advancement consists of higher pay rather than more responsibility or a higher position.

Employment Outlook

Kindergarten and elementary school teachers are expected to face competition for jobs of their choice through the mid-1980's. If patterns of entry and reentry to the profession continue in line with past trends, the number of persons qualified to teach in elementary schools will exceed the number of openings.

The basic sources of teacher supply are recent college graduates qualified to teach at the elementary level and teachers seeking reentry to the profession. Reentrants, although more experienced, will face increasing competition from new graduates, who command lower salaries and have more recent training.

Pupil enrollment is the basic factor underlying the need for teachers. Because of fewer births in the 1960's, elementary enrollments have been on the decline since 1967, when they peaked at nearly 32 million. The National Center for Education Statistics projects that by 1982 the downward enrollment trend will halt at a level of 28 million, and enrollments again will advance to about 29 million by 1985.

Teachers will be needed to fill new positions created by larger enrollments; to replace those who are not now certified; to meet the expected pressure for an improved pupil-teacher ratio; and to fill positions vacated by teachers who retire, die, or leave the profession for other reasons.

However, a decline in the projected number of children born over the next decade could lessen the demand for teachers. While the trend has not been clearly established, since 1970 women have continued to have fewer children, and according to a recent survey, they expect to continue having smaller families than were common 10 years ago.

Several factors could alter the outlook for teachers. Increased emphasis on early childhood education, on special programs for disadvantaged children, and on individual instruction may result in larger enrollments, smaller student-teacher ratios, and consequently an increased need for teachers. Possible budget restraints for educational services, on the other hand, might limit expansion.

Earnings and Working Conditions

According to the National Education Association, public elementary school teachers averaged $11,870 a year in 1976. Average earnings in 1976 were more than one and one-third times as much as the average earnings for all nonsupervisory workers in private industry, except farming. Generally, States in the Northeast and in the West paid the highest salaries.

Collective bargaining agreements cover an increasingly large number of teachers. In 1976, 31 States had enacted laws that required collective bargaining in the teacher contract negotiation process. Most public school systems that enroll 1,000 students or more bargain with teacher organizations over wages, hours, and the terms and conditions of employment.

Public school systems enrolling 6,000 or more pupils paid teachers with a bachelor's degree average starting salaries of $8,233 a year in 1974-75. Those with a master's degree earned a starting average of $9,159 a year.

Public elementary school teachers worked an average of about 36-1/2 hours a week in 1976. Additional time spent preparing lessons, grading papers, making reports, attending meetings, and supervising extracurricular activities increased the total number of hours to about 46.

In addition to their regular teaching assignments, some elementary school teachers teach summer sessions, take courses, or work at other jobs, such as camp counselors. Most elementary school teachers work a traditional two-semester, 9-month school year. Some, however, work in year-round schools where they work an 8-week session, are off 1 week, and have a longer midwinter break. This type of schedule may make finding additional employment outside of the school system difficult.

Teachers spend much of their time walking, kneeling, or even sitting on the floor. For example, kindergarten teachers may join their students on the floor to finger paint, cut out pictures, or do other crafts.

Employment in teaching is steady, and business conditions usually do not affect the market for teachers. In 1976, 38 States and the District of Columbia had tenure laws that insured the jobs of teachers who had successfully taught for a certain number of years.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

Information on the Teacher Corps, internships, graduate fellowships, and other information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20005.

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

SECONDARY SCHOOL TEACHERS

(D.O.T. 091.228)

Nature of the Work

The high school years are the years of transition from childhood to young adulthood. They are the years when students delve more deeply into subject matter introduced in elementary school and learn more about

INCLINED PLANE
CLASS
INTRODUCTION
PROCEDURE
ANALYSIS OF DATA

Teachers must strive to create an atmosphere for learning.

themselves and the world. It is also a time of preparation for their future lives as citizens and jobholders. Secondary school teachers have a direct role in this process.

The primary function of the secondary school teacher is to instruct students in a specific subject such as English, mathematics, social studies, or science. Within a teacher's specialized subject area, he or she may teach a variety of courses. A social studies teacher, for example may instruct two 9th grade classes in American History, two 12th grade classes in Contemporary American Problems, and another class in World Geography. For each class, the teacher develops lesson plans, prepares and gives examinations, and arranges other activities, such as a class project to devise an urban redevelopment plan for the city.

Teachers also must design their classroom presentations to meet the individual needs and abilities of their students. They may arrange tutoring for students, or give advanced assignments for highly motivated pupils. Recognizing the needs of each student can be difficult because most teachers conduct five separate classes a day.

Teachers use a variety of instructional materials including films, slides, and computer terminals. They also may arrange for speakers or trips to supplement their classroom lectures such as a visit to the planetarium after a discussion on the earth's rotation.

Some teachers train students for specific jobs after graduation such as welding, automechanics, or distributive education. These teachers instruct with the actual tools of the trade whether they be adding machines or an 8-cylinder car engine.

Secondary school teachers also supervise study halls and homerooms, and attend meetings with parents and school personnel. Often they work with student groups outside of class to help solve specific problems. Teachers also participate in workshops and college classes to keep up-to-date on their subject specialty and on current trends in education.

In recent years, teachers have been able to spend more time teaching due to the increased availability of teacher aides who perform secretarial work, grade papers, and do other routine tasks.

Places of Employment

In 1976, more than 1 million teachers taught in secondary schools. More than 90 percent of them taught in public schools. Although they work in all parts of the country, teachers are concentrated in cities and in suburban areas.

According to a recent survey, slightly more than one-half of all public secondary teachers teach in senior high schools; about one-third teach at the junior high level. About one-tenth teach in junior-senior high schools, and a very small number are elementary-secondary combination teachers.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public secondary school teachers to be certified. Many States also require certification of secondary teachers in private and parochial schools.

The minimum educational requirement for certification is a bachelor's degree. In 1976, the District of Columbia was the only jurisdiction requiring a master's degree for initial certification as a senior high school teacher. Fourteen States, however, have specified that a secondary school teacher must get additional education, usually a fifth year of study or a master's degree, within a certain period after beginning employment. As a result, more and more secondary school teachers are obtaining advanced degrees.

The educational requirements for secondary school teachers vary by State and by school system. Approved colleges and universities in every State offer programs that include the education courses and the student-teaching that States require. They also offer the academic courses that are necessary to qualify teachers in the various subject specialties taught at the secondary level.

States and local jurisdictions often have general teacher requirements, such as the recommendation of the college, a certificate of health, and U.S. citizenship. Prospective teachers may get complete information on such educational and general requirements from each State department of education and from the superintendent of schools in each community.

Aside from educational requirements, a secondary school teacher must want to work with young people, have an interest in a special subject, and have the ability to motivate students and to relate knowledge to them.

Education and experience provide the primary basis for advancement, usually in the form of higher salaries rather than a different job. Advancement to supervisory and administrative positions usually requires at least 1 year of professional education beyond the bachelor's degree and several years of successful classroom teaching. Only a small proportion of secondary school teachers, however, advance to administrative positions.

Some experienced teachers with specific preparation may work as special school service personnel, such as school psychologists, reading specialists, or guidance counselors. Often these jobs require special certification as well as special education.

Employment Outlook

The supply of secondary school teachers through the mid-1980's will greatly exceed anticipated requirements if past trends of entry into the profession continue. As a result, prospective teachers are likely to face keen competition for jobs.

The prime sources of teacher supply are recent college graduates qualified to teach secondary school and teachers seeking to reenter the profession. Although reentrants have experience in their favor, many schools may prefer to hire new graduates who command lower salaries and whose training is more recent.

Pupil enrollment is the basic factor underlying the demand for teachers. The National Center for Education Statistics projects that enrollment in secondary schools will decline and, in turn, reduce the demand for teachers. As a result, over the 1976-85 period, nearly all teaching positions will stem from the need to replace teachers who die, retire, or leave the profession for other reasons. Thus, an increasing proportion of prospective teachers will have to consider alternatives to secondary school teaching.

Although the overall outlook for secondary teachers indicates a highly competitive market, employment conditions may be more favorable in certain fields. According to a recent survey, the supply of teachers of vocational subjects was not adequate to meet the demand. Mathematics, natural sciences, and physical sciences should not experience as large an oversupply as some other subjects.

Earnings and Working Conditions

According to the National Education Association, public secondary school teachers averaged $12,395 per year in 1976. This is 1 1/2 times the average for nonsupervisory workers in private industry, except farming. Generally, salaries were higher in the Northeast and in the West than they were in the Southeast and in the Middle States.

In school systems with enrollments of 6,000 or more, beginning teachers with a bachelor's degree earned average salaries of $8,233 in the school year 1974-75. New teachers with a master's degree started at $9,159 a year. Beginning teachers could expect regular salary increases as they gained experience and additional education.

A recent survey of public school teachers indicated that the average required school week for those in secondary schools was 37 hours. However, when all teaching duties, including meetings, lesson preparation, and other necessary tasks are taken into consideration, the total number of hours spent working each week was slightly more than 48.

In some schools, teachers receive supplementary pay for certain school-related activities such as coaching in sports and working with students in extracurricular activities, such as music, dramatics, or school publications. Some public school teachers also work in their school systems during the summer. Others hold summer jobs outside the school system.

While many teachers work the traditional 9-month school year with a 3-month summer vacation, some districts have converted to a year-round schedule. Teachers on this type of schedule may work 8 weeks, be on vacation for 1 week, and have a 5-week midwinter break. Laws in 38 States and the District of Columbia ensure the employment of those who have achieved tenure status. Laws requiring collective bargaining of wages, hours, and the terms and conditions of employment cover increasing numbers of teachers.

Sources of Additional Information

Information on schools and certification requirements is available from local school systems and State departments of education.

Information on the Teacher Corps, internships, graduate fellowships, and other information on teaching may be obtained from:

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

Other sources of general information are:

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20005.

National Education Association, 1201 16th St. NW., Washington, D.C. 20036.

COLLEGE AND UNIVERSITY TEACHERS

(D.O.T. 090.168 and .228)

Nature of the Work

Each year thousands of Americans enter college. Some view college as a personal enrichment experience. Others seek higher education to obtain a lucrative and interesting job. Many persons attend college for a variety of reasons. To meet these diversified demands, colleges and universities hire well-educated teachers to provide instruction in various subjects.

The primary function of the college or university teacher is to present an in-depth analysis of a particular subject matter. Many teachers conduct a variety of courses such as a basic, freshman English composition course and an advanced poetry class for students majoring in English. Many instruct undergraduates only, while some instruct both undergrad-

Professor instructing teacher education class.

uates and graduate students. Still fewer instruct only graduate students. Usually, the more experienced and educated teachers conduct the higher level classes.

College and university teachers use various presentations in their classes, depending on the subject, interest, and level of their students. Some conduct large lecture classes for basic courses while others lead advanced seminars with only a few students. Still others work primarily in laboratories for subjects such as biology, engineering, or chemistry. Some teachers have the aid of teaching assistants who usually are studying for advanced degrees. Closed-circuit television, tape recorders, and other machines frequently are used.

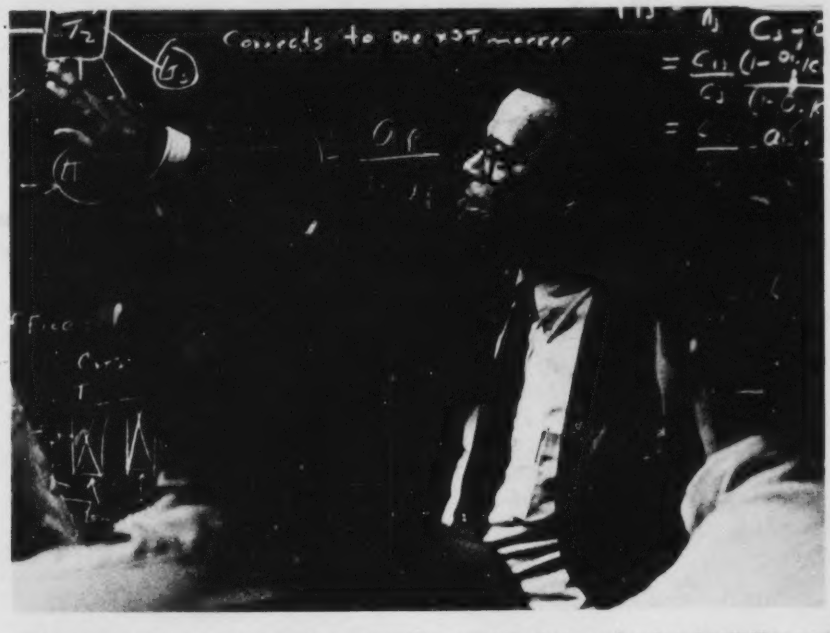
To be effective, college teachers must keep up with developments in their field by reading current material, participating in professional activities, and conducting research. Some publish books and articles. The importance of research and publication varies from one institutional level to another. For example, a recent survey indicated that more than one-third of the Ph. D. faculty in doctorate level science and engineering departments spent more than half of their time in research activities. Research usually is stressed more at 4-year colleges and universities than at junior and community colleges.

In addition to time spent on preparation, instruction, and evaluation, college and university teachers participate in faculty activities; work with student organizations and act as student advisors; work with the college administration; and in other ways serve the institution and the community. Those who are department heads have supervisory and administrative duties.

Places of Employment

In 1976, about 593,000 teachers worked in more than 3,000 colleges and universities. About 70 percent of them taught in public institutions. An estimated 441,000 were full-time senior staff; about 145,000 were part-time senior staff; and 7,000 were full-time junior instructors. In addition, there were thousands of part-time assistant instructors, teaching fellows, teaching assistants, or laboratory assistants who aided these teachers while studying for their advanced degrees.

Of full-time faculty, about one-third teach in universities; about two-fifths work in 4-year colleges; and about one-fifth teach in 2-year colleges. About two-thirds of the faculty in universities and 4-year colleges teach in public institutions; more than nine-tenths of the faculty in 2-year institutions work in public junior and community colleges.



Many college teachers, in addition to teaching, participate in professional activities and conduct research.

Training, Other Qualifications, and Advancement

Most college and university faculty are classified in four academic ranks: instructors, assistant professors, associate professors, and full professors. About 75 percent of all faculty are assistant, associate, or full professors, with the three ranks equally distributed. Twenty percent are instructors.

Most inexperienced persons are hired as instructors and must have at least a master's degree. To advance to higher ranks, instructors need additional training plus experience. Assistant professors usually need a year of graduate study beyond the master's degree and at least a year or two of experience as an instructor. Appointments as associate professors frequently demand the doctoral degree and an additional 3 years or more of college teaching experience. For a full professorship, the doctorate, extensive teaching experience, and published articles and books usually are essential.

In addition to advanced study and college-level teaching experience, outstanding academic, administrative, and professional contributions influence advancement. Research, publication, and work experience in a subject area may hasten advancement.

Employment Outlook

College and university teaching candidates are expected to face keen competition through the mid-1980's. Although demand for these teachers is expected to increase, the number of master's and Ph. D. degree recipients is expected to greatly exceed all openings resulting from growth and separations from the profession. The number of Ph. D. recipients alone, in fact, is likely to exceed the expected number of openings. Therefore, an increasing proportion of prospective college teachers, especially those with only master's degrees, will have to seek nonacademic jobs. Government and private industry should provide some positions, but some persons holding graduate degrees may find it necessary to enter occupations that have not traditionally required advanced study.

Those seeking a teaching position will find the best opportunities at public colleges and universities.

The basic factor underlying the demand for teachers is college enrollment. During the 1960's and early 1970's, teacher employment expanded due to growth in both the number of college-age persons and the proportion of 18- to 21-year-olds enrolled in college. Enrollments are expected to increase through the mid-1980's and then decline somewhat, but to a level higher than at present. As a result, the total number of teachers needed over the period is expected to rise.

The type and level of the institution and the extent to which it wishes to upgrade its faculty also will influence the demand for teachers. Although enrollments in the 1970's are expected to stabilize in 4-year colleges and universities, many institutions, including junior and community colleges, may want to hire additional Ph. D.'s to upgrade their faculties. This, coupled with an increasingly large supply of Ph. D.'s, will make it especially difficult for master's degree holders to find teaching positions in 4-year institutions.

Earnings and Working Conditions

Earnings varied widely according to faculty rank and type of institution. In general, teachers in public institutions (in both 2-year and 4-year schools) averaged higher salaries than teachers in private schools in 1975-76. Salaries ranged from an average minimum of $7,272 for instructors in private 2-year institutions, to an average maximum of $25,387 for professors at 4-year public institutions.

In 1975-76, about one-third of all institutions paid according to salary schedules by rank. On the average, more public than private institutions had these schedules. In institutions without schedules, a college senate often determined salaries according to a general set of criteria.

Since about 2 out of 3 college teachers have 9- to 10-month contracts, many have additional summer earnings from research, writing for publication, or other employment. Royalties and fees for speaking engagements may provide additional earnings. Some teachers also undertake additional teaching or research projects or work as consultants.

College and university teachers also may enjoy certain benefits, including tuition waivers for dependents, housing allowances, travel allowances, and paid leaves of absence. Colleges typically grant a semester's leave after 6 or 7 years of employment.

About 85 percent of all college and university teachers work in institutions that have tenure systems. Of the full-time teachers employed in these institutions, over one-half are tenured. Under a tenure system, a teacher usually receives 1-year contracts during a probationary period ranging from 3 to 7 years; some universities award 2- or 3-year contracts. After the probationary period, institutions consider teachers for tenure (the assurance of continuing employment with freedom from dismissal without cause).

Most teachers work in institutions run on a semester basis; others work in schools that are on trimesters with shorter breaks between each school session.

College teachers usually have flexible teaching schedules. According to a recent survey, the undergraduate faculty in 4-year colleges and universities normally teach 12 hours a week and seldom more than 14 or 15 hours. Graduate faculty have a teaching load of about 10 hours a week. In addition to time spent in the classroom, college and university teachers devote much time to preparation and other duties. Overall, full-time faculty spend about 55 hours a week on school-related activities. For faculty in junior and community colleges, the normal teaching load is slightly heavier, but the total number of hours on the job are fewer.

Sources of Additional Information

Information on college teaching as a career is available from:

U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C. 20202.

American Council on Education, 1 Dupont Circle NW., Washington, D.C. 20036.

American Federation of Teachers, 1012 14th St. NW., Washington, D.C. 20065.

Professional societies in the various subject fields will generally provide information on teaching requirements and employment opportunities in their particular fields. Names and addresses of societies are given in the statements on specific professions elsewhere in the *Handbook*.

TECHNICAL WRITERS

(D.O.T. 139.288)

Nature of the Work

Technical writers put scientific and technical information into language that can readily be understood by people who need to use it. They research, write, and edit technical materials and also may produce publications or audiovisual materials. To ensure that their work is accurate, technical writers must be expert in the subject area in which they are writing—laser beams or pharmacology, for example. At the same time, their writing must be clear and easy to follow. Command of the language and versatility of style are tools of the trade that enable technical writers to convey information in a way that is helpful to people who use it—scientists, technicians, executives, sales representatives, and the general public.

Some organizations use job titles other than "technical writer." Depending on the particular employer, people in technical writing jobs may be called publications engineers, communications specialists, industrial writers, medical writers, communicators, or instructional materials developers.

Technical writers set out either to instruct or inform, and in many instances they do both. They prepare manuals, catalogs, parts lists, and instructional materials needed by the sales representatives who sell machinery or scientific equipment and by the technicians who install, maintain, and service it. Instructional aids must be prepared to assist the people who operate complex equipment—for example, the technicians who monitor sophisticated diagnostic equipment in a hospital's coronary care unit. Writing manuals and training aids for military weapons and equipment is a highly specialized field of technical writing. Sometimes technical writers are asked to write scripts for training films, or to prepare instructional materials for self-teaching cassettes, filmstrips, or kits.

Many technical writers prepare reports on the results of research projects. By communicating research developments to other scientists, engineers, and technicians, these reports speed scientific and technical progress and help prevent duplication of effort. Reports also play an important part within a company; hundreds of progress reports may be sent from one department to another within the course of a year. Detailed reports also must be prepared for regulatory agencies and for agencies that fund research and development projects. Some reports—environmental impact statements, for example—require such a detailed treatment of technical subjects that they usually are prepared by scientists with the assistance of technical writers. Annual reports to stockholders sometimes are an additional responsibility.

Proposal preparation is another important duty of technical writers. Proposals are requests for the money or facilities to conduct a project, develop a prototype of a new product, or do research. When a proposal is being prepared, scientists and engineers provide the technical materials, management provides the budget, and a team of technical writers usually shapes the final proposal.

Manuals, reports, and proposals make up the bulk of technical writing today; however, the work may take other forms. Technical writers may write specifications; prepare speeches and news releases; edit and write technical books; prepare articles for popular magazines; develop advertising copy, promotional brochures, and text for exhibits and displays; and handle technical documentation.

When they begin a writing assignment, technical writers usually start by learning as much as they can about the subject. They study reports, sometimes blueprints; read technical journals; consult with engineers, scientists, and technicians who have worked on the project; or examine the equipment. After they have assembled as much information as appropriate, given the time they have and the purpose of the document, they draw up an outline. Then they prepare a rough draft, which may undergo several revisions before being accepted in final form. Technical writers usually arrange for the preparation of tables, charts, illustrations, and other artwork that accompanies a finished document and may work directly with technical illustrators, drafters, or photographers.

Places of Employment

An estimated 22,000 technical writers and editors were employed in 1976. Many work for large firms in the electronics, aviation, aerospace, ordnance, chemical, pharmaceutical, and computer manufacturing industries. Firms in the energy, communications, and computer software fields also employ many technical writers.

Research laboratories employ significant numbers of technical writers. Some laboratories are affiliated with manufacturing companies to concentrate on developing products or improving the manufacturing process. Other research laboratories—including those connected with universities, government agencies, or private foundations—engage in both basic and applied research.

The Federal Government employs technical writers and editors in areas as diverse as the physical sciences, weapons development, agriculture, health, and space exploration. Three out of four technical writers and editors in the Federal Government work for the Department of Defense. Other agencies that employ technical writers include the Departments of Interior; Agriculture; Health, Education,and Welfare; and the National Aeronautics and Space Administration.

Many people in this occupation work directly for publishing houses. They hold writing and editing jobs with business and trade publications; professional journals in engineering, medicine, physics, chemistry, and other sciences; and publishers of scientific and technical literature.

The rapidly growing information industry provides a new area of employment for technical writers. Commercial firms that provide their clients with access to a computerized data base employ technical information specialists to collect, process, and manage a vast amount of information. Technical writers are particularly well suited for such jobs because of their combination of technical and communications skills. Such jobs also are available at the technical information centers run by major industrial firms and research laboratories.

Established technical writers may work on a free-lance basis or open their own agencies or consulting firms.

Technical writers are employed all over the country but the largest concentrations are in the Northeast, Texas, and California.

Training, Other Qualifications, and Advancement

There are no rigid requirements for entry into the field. As a result, people having a variety of backgrounds find jobs as technical writers. Employers seek people whose educational background or work experience indicates that they are familiar with a technical subject and can write about it effectively. Knowledge of graphics and other aspects of publication production may be helpful in getting a job. An understanding of current trends in communication technology is an asset, and familiarity with computer operations and terminology is increasingly important.

A college degree is helpful, and many employers insist on it. Hiring criteria vary, however. Many employers prefer candidates with a degree in science or engineering plus a minor in English, journalism, or technical communications. Other employers emphasize writing ability and, in turn, look for candidates whose degrees are in journalism or the liberal arts. Depending on their line of business, these employers almost always require course work or practical experience in a specific subject as well—computer science or biochemistry, for example.

Besides having writing skills and scientific or technical expertise, technical writers should be intellectually curious and able to think logically. They must be very accurate in their work and must be able to deal precisely with a mass of detailed material. Because they often work as part of a team, they should be able to work with others; this requires tact and a cooperative attitude. Technical writers sometimes work alone for long periods with little or no supervision, so they must also be disciplined about work habits and schedules.

Most technical writers do not enter the occupation directly from college. The majority work initially in other jobs, usually as technicians, scientists, or engineers. Some begin as research assistants, editorial assistants, or trainees in a company's technical information or advertising department. In time, these people may assume writing duties and develop technical communication skills. When a flair for writing becomes evident, they may seek a technical writing position in the same company or find a writing job elsewhere.

The majority of technical writers have work experience as technicians, scientists, or engineers.

While many employers consider only seasoned, experienced writers in filling vacancies, not all do. Some firms hire college graduates for writer trainee positions. People with solid backgrounds in science or engineering are at an advantage in competing for such jobs. Those with bachelor's or master's degrees in technical writing are often preferred over candidates who have little or no writing background. However, a degree in almost any field may be acceptable, providing the candidate has the necessary technical and communications skills. Beginners can develop experience and demonstrate their ability through writing material for local weekly newspapers and by publishing articles in student journals. A portfolio of writing samples is helpful when applying for a job.

In 1976, 10 colleges and universities offered programs leading to a bachelor's degree in technical writing, and 4 schools had associate degree programs. Graduate programs leading to a master's degree in technical writing were offered at six schools, one of which also offered a Ph. D. These programs have various names, including science or medical writing, science information, technical journalism, and technical communication.

Most undergraduate programs in technical writing are interdisciplinary. While such programs may be based in the communications, journalism, or language and literature department, they generally are given in close cooperation with the mathematics, engineering, and science departments. At most schools, about 30 percent of the student's course work is in communications. Typical courses include communication theory, writing and editing, layout and design, and graphics. From 25 to 40 percent of the courses are in science or technology. The remainder of the program may be in the social sciences and humanities, or may be devoted entirely to electives. Students usually are advised to take courses in related fields such as computer science and statistics. At many schools, internships in industry or government give students in the technical writing program an opportunity for first-hand job experience.

Graduate programs in technical writing emphasize the field of communications. Many graduate students in technical writing already have a bachelor's degree in science, engineering, or technology. Others come from liberal arts backgrounds. A typical graduate program includes courses in the theory of communication, writing and editing, technology assessment, and management.

Although only a few schools offer degrees in technical writing or technical illustrating, hundreds of colleges and universities offer one or more courses in these fields. Students with such diverse majors as agriculture, chemistry, engineering, and business administration can elect courses in advanced composition, copy editing, typography, technical advertising, industrial communications, and proposal writing, for example. Many engineering schools offer English courses to sharpen writing skills, and several have developed extensive course offerings in technical writing.

Several schools of journalism offer courses in medical journalism.

Numerous special institutes, seminars, and workshops are available to bring technical writers up to date. Some take the form of intensive 1- or 2-week summer seminars sponsored by colleges and universities. Others are workshops run by technical communication consultants or by organizations that specialize in employee training and development.

Beginners often assist experienced technical writers by doing library research and preparing drafts of reports. Experienced writers in companies with large technical writing staffs may move to the job of technical editor or shift to an administrative position in the publications or technical information departments. The top job is that of publications manager, who normally supervises all of the people directly involved in producing the company's technical documents. The manager supervises not only the technical writers and editors, but also the staff responsible for illustrations, photography, reproduction, and distribution.

After gaining experience and contacts, some technical writers freelance or form their own firms. Some consulting firms handle industrial publicity and technical advertising for corporate clients. Other technical communications firms do the actual writing and production of the catalogs, manuals, and brochures that may be needed for the promotion of a new product, for example. Successful technical writers are frequently in demand to conduct writing seminars in industry and government, and some teach at colleges and universities in addition to their regular jobs.

It also is possible to advance by becoming a specialist in a particular scientific or technical subject. These writers sometimes prepare syndicated newspaper columns or articles for popular magazines.

Employment Outlook

Employment of technical writers is expected to increase about as fast as the average for all occupations through the mid-1980's. In addition to openings due to growth, opportunities will result from the need to replace those who die, retire, or transfer to other occupations. Employment opportunities will be best for experienced technical writers and for beginners who have both writing ability and a scientific or technical background. People who cannot demonstrate both a technical background and communications skills may face stiff competition for beginning jobs.

Demand for technical writers is expected to increase because of the continuing expansion of scientific and technical information and the need to communicate research results to the scientific community as effectively as possible. Also contributing to the demand for technical writers is the growing need to put scientific and technical information into language that corporate managers, sales representatives, and service technicians can understand. With the increasing sophistication and complexity of industrial and scientific equipment, more and more users will depend on the technical writer's ability to prepare explanations and instructions in precise but simple terms.

Government expenditures for research and development (R&D) will continue to have a significant effect on job opportunities for technical writers. Their employment, like that of scientists and engineers, is linked to spending levels for basic research and for product development in such important areas as defense, space exploration, energy, pollution control, medicine, and communications technology. Through the mid-1980's, R&D expenditures are expected to increase, but growth will be slower than it was during the peak period of the 1960's.

Relatively few job openings are expected in the Federal Government. The number of technical writers and editors employed by Federal agencies has declined since the late 1960's, and most vacancies will occur as Federal employees retire or transfer to other jobs.

Earnings and Working Conditions

Salaries depend not only on the amount and kind of education a technical writer has, but also on experience and the ability to produce. The type, size, and location of the employer also are important. Earnings generally are higher on the East Coast and in California than in other parts of the country. Free-lancing can be an important source of additional income, but freelance earnings vary greatly because they depend on the writer's ability and reputation.

Starting salaries for college graduates began at about $10,000 in 1976, although graduates with degrees in engineering, science, or technical communications generally began at $12,000 or more. Experienced technical writers averaged around $19,500 a year in 1976, while those in supervisory positions earned $25,000 or more. There were substantial regional variations, however.

In the Federal Government in 1977, beginning technical writers with a bachelor's degree and about five science courses were paid $9,303 a year; those with a bachelor's degree and 1 year's specialized experience could start at $11,523 a year. The average salary for technical writers in Federal agencies was $19,901.

Technical writers, in and out of government, may work under considerable pressure, frequently working overtime to meet publication deadlines. Their working environment generally is clean and well-lighted.

Sources of Additional Information

For information about careers in technical writing, and the names of colleges and universities that offer programs in technical communication, contact:

Society for Technical Communication, Inc., Suite 421, 1010 Vermont Ave. NW., Washington D.C. 20005.

For information about careers and workshops in the field of health communication, contact:

American Medical Writers Association, Suite 290, 5272 River Rd., Bethesda, Md. 20016.

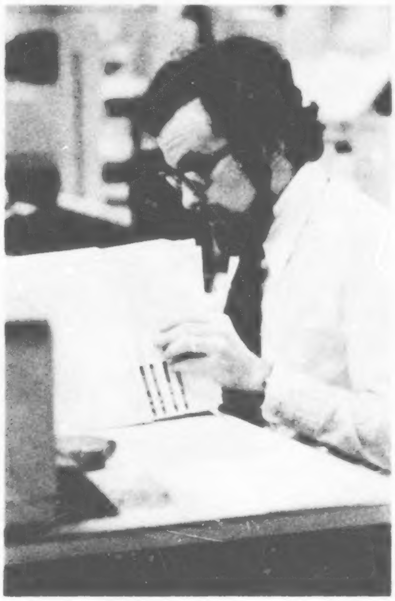
UNDERWRITERS

(D.O.T. 169.188)

Nature of the Work

Insurance companies assume millions of dollars in risks each year by transferring chance of loss from their policyholders to themselves. Underwriters appraise and select the risks their company will insure. (The term underwriter sometimes is used in referring to insurance agents; see the statement on insurance agents and brokers elsewhere in the *Handbook* for a discussion of that occupation.)

Underwriters decide whether their companies will accept risks after analyzing information in insurance applications, reports from loss control consultants, medical reports, and actuarial studies (reports that describe the probability of insured loss). Some routine applications that require very little independent judgment are handled by computers. Generally, however, underwriters use considerable personal judgment in making decisions. Because these decisions are seldom reviewed at a higher level, underwriters have great responsibility. Their companies may lose business to competitors if they appraise risks too conservatively or may have to pay many future claims if their underwriting actions are too liberal.



Underwriters analyze information presented on policy applications.

When deciding that a policy is an acceptable risk, an underwriter may outline the terms of the contract, including the amount of the premium. Underwriters frequently correspond with policyholders, agents, and managers about policy cancellations or requests for information. In addition, they sometimes accompany salespeople on appointments with prospective customers.

Most underwriters specialize in one of three major categories of insurance: life, property and liability, or health. They further specialize in group or individual policies. The property and liability underwriter specializes by type of risk insured, such as fire, automobile, marine, or workers' compensation. Some underwriters, called commercial account underwriters, handle business insurance exclusively. They often must evaluate a firm's entire operation in appraising its insurance application. There is a growing trend in casualty companies toward "package" underwriting, where various types of risks are insured under a single policy. In such a situation, the underwriter would have to be familiar with several different lines of insurance rather than specializing in a single line.

An increasing proportion of total insurance sales is being made through group contracts. A standard group insurance policy insures all persons in a specified group through a single contract at uniform premium rates; this type of group policy generally provides life or health insurance protection. The group underwriter analyzes the overall composition of the group to be sure that total risk is not excessive. A different type of group policy finding increasing acceptance is the policy that provides the members of a group—a labor union, for example—with individual policies geared to their own circumstances. These policies generally are in the casualty field, covering automobiles, pleasure boats, and homes. The casualty underwriter analyzes the application of each group member and makes individual appraisals. Some group underwriters attend meetings with union or employer representatives to discuss the types of policies available to their groups.

Places of Employment

An estimated 25,000 persons worked as insurance underwriters in 1976. Over three-fourths were property and liability underwriters working in regional or home offices throughout the United States; most life insurance underwriters are in home offices in a few large cities, such as New York, San Francisco, Chicago, Dallas, and Philadelphia.

Training, Other Qualifications, and Advancement

For beginning underwriting jobs, most large insurance companies seek college graduates who have a degree in liberal arts or business administration, but a major in almost any field provides a good general background. Some small companies hire persons with less than a college degree for underwriter trainee positions. In addition, some high school graduates who begin as underwriting clerks may be trained as underwriters after they demonstrate an aptitude for the work.

Underwriter trainees begin by evaluating routine applicants under the close supervision of an experienced risk appraiser. They study claim files to become familiar with factors associated with certain types of losses. As they develop the sound judgment that is required, they are assigned policy applications that are more complex and have a greater face value.

Continuing education is a necessity if the underwriter expects to advance to senior level positions. Insurance companies generally place great emphasis on completion of one or more of the recognized independent study programs. Many companies pay tuition and the cost of books for those who satisfactorily complete underwriting courses; some offer salary increases as an additional incentive. Independent study programs are available through the American Institute of Property and Liability Underwriters, the American College of Life Underwriters, the Academy of Life Underwriters, the Health Insurance

Association of America, and the Life Office Management Association.

Underwriting can be a satisfying career for persons who like working with details and enjoy relating and evaluating information. In addition to analyzing problems, underwriters must make prompt decisions and be able to communicate their ideas to others. They must also be imaginative and aggressive, especially when they have to get additional information from outside sources.

Experienced underwriters who complete study courses may advance to chief underwriter or underwriting manager. Some underwriting managers are promoted to senior managerial jobs after several years.

Employment Outlook

Employment of underwriters is expected to rise about as fast as the average for all occupations through the mid-1980's as insurance sales continue to expand. Each year many jobs will become available as the occupation grows and as those who die, retire, or transfer to other work are replaced.

Several factors underlie the expected growth in the volume of insurance and the resulting need for underwriters. Over the next decade, a much larger portion of our population will enter their most productive years. As this traditional market for life insurance expands, the volume of insurance sales also should rise. This will occur as more individuals purchase life insurance to protect their families' standard of living, finance their children's education, or provide retirement income. Property and liability insurance sales also should expand as purchases of automobiles, pleasure boats, and other consumer durables increase. Both spending for new home construction and the American public's growing security consciousness should contribute to demand for more extensive insurance protection. New or expanding businesses will need protection for new plants and equipment and insurance for workers' compensation and product liability. Heightened competition among insurance companies and changes in regulations affecting investment profits also are expected to increase the insurance industry's need for competent underwriters.

Earnings and Working Conditions

Underwriters in life insurance who had 2 to 4 years' experience averaged $12,600 a year in 1976, according to a Life Office Management Association (LOMA) survey. Senior life underwriters (those with 5 to 8 years' experience) averaged $16,600, while senior group underwriters earned average salaries of $17,400. Supervisors of underwriting in life insurance companies averaged $17,500 to $23,000. In most cases, underwriters in larger companies earned higher salaries.

A recent survey of companies that sell property and liability insurance showed that underwriters with 2 to 4 years' experience averaged $12,300 a year in 1976. Earnings varied substantially by underwriting specialty, however: personal lines underwriters earned average salaries of $11,700, while those specializing in surety bonds averaged $14,300. Senior underwriters earned substantially higher incomes—personal lines underwriters averaged $15,200 while those specializing in commercial lines received an average of $15,000 a year. Experienced underwriters earn about 1 1/2 times the average earnings of nonsupervisory workers in private industry, except farming. Underwriting supervisors in property and liability companies averaged $17,500 a year in 1976.

Most underwriters have desk jobs that require no unusual physical activity. Although the average week is 37 hours, underwriters sometimes work overtime. Most insurance companies have liberal vacation policies and other employee benefits. (See the statement on the Insurance Industry for additional information on working conditions and employee benefits.)

Sources of Additional Information

General information about a career as an insurance underwriter is available from the home offices of many life insurance and property and liability insurance companies. Information about career opportunities as an underwriter also may be obtained from:

American Council of Life Insurance, 1850 K St., NW., Washington, D.C. 20006

Insurance Information Institute, 110 William St., New York, N.Y. 10038.

American Mutual Insurance Alliance, 20 N. Wacker Dr., Chicago, Ill. 60606.

The National Association of Independent Insurers, Public Relations Department, 2600 River Rd., Des Plaines, Ill. 60018.

URBAN PLANNERS

(D.O.T. 199.168)

Nature of the Work

Urban planners, often called community or regional planners, develop programs to provide for future growth and revitalization of urban, suburban, and rural communities. They help local officials make decisions to solve social, economic, and environmental problems.

Planners examine community facilities such as health clinics and schools to be sure these facilities can meet the demands placed upon them. They also keep abreast of the legal issues involved in community development or redevelopment and

Urban planners view the present and future development of the east coast.

changes in housing and building codes. Because suburban growth has increased the need for better ways of traveling to the urban center, the planner's job often includes designing new transportation and parking facilities.

Urban planners prepare for situations or needs that are likely to develop as a result of population growth or social and economic change. They estimate, for example, the community's long-range needs for housing, transportation, and business and industrial sites. Working within a framework set by the community government, they analyze and propose alternative ways to achieve more efficient and attractive urban areas.

Before preparing plans for long-range community development, urban planners prepare detailed studies that show the current use of land for residential, business, and community purposes. These reports present information such as the arrangement of streets, highways, and water and sewer lines, and the location of schools, libraries, and playgrounds. They also provide information on the types of industries in the community, characteristics of the population, and employment and economic trends. With this information, urban planners propose ways of using undeveloped land and design the layout of recommended buildings and other facilities such as subways. They also prepare materials that show how their programs can be carried out and the approximate costs.

Urban planners often confer with private land developers, civic leaders, and officials of public agencies that do specialized planning. They may prepare materials for community relations programs, speak at civic meetings, and appear before legislative committees to explain and defend their proposals.

In small organizations, urban planners must be able to do several kinds of work. In large organizations, planners usually specialize in areas such as physical design, community relations, or the reconstruction of rundown business districts.

Places of Employment

About 16,000 persons were urban planners in 1976. Most work for city, county, or regional planning agencies. A growing number are employed by States or by the Federal Government in agencies dealing with housing, transportation, or environmental protection.

Many planners do consulting work, either part time in addition to a regular job, or full time working for a firm that provides services to private developers or government agencies. Urban planners also work for large land developers or research organizations and teach in colleges and universities.

Training, Other Qualifications, and Advancement

Employers often seek workers who have advanced training in urban planning. Most entry jobs in Federal, State, and local government agencies require 2 years of graduate study in urban or regional planning, or the equivalent in work experience. Although the master's degree in planning is the usual requirement at the entry level, some people who have a bachelor's degree in city planning, architecture, landscape architecture, or engineering may qualify for beginning positions.

In 1976, over 80 colleges and universities gave a master's degree in urban planning. Although students holding a bachelor's degree in architecture or engineering may earn a master's degree after 1 year, most graduate programs in urban planning require 2 or 3 years to complete. Graduate students spend considerable time in workshops or laboratory courses learning to analyze and solve urban planning problems. Students often are required to work in a planning office part time or during the summer while they are earning the graduate degree.

Candidates for jobs in Federal, State, and local government agencies usually must pass civil service examinations to become eligible for appointment.

Planners must be able to think in terms of spatial relationships and to visualize the effects of their plans and designs. They should be flexible in their approaches to problems and be able to cooperate with others and reconcile different viewpoints to achieve constructive policy recommendations.

After a few years' experience, urban planners may advance to assignments requiring a high degree of independent judgment, such as outlining proposed studies, designing the physical layout of a large development, or recommending policy, program, and budget options. Some are promoted to jobs as planning directors, and spend a great deal of time meeting with officials in other organizations, speaking to civic groups, and supervising other professionals. Further advancement is more difficult at this level and often occurs through a transfer to a large city, where the problems are more complex and the responsibilities greater.

Employment Outlook

Employment of urban planners is expected to grow faster than the average for all occupations through the mid-1980's. In addition to openings created by future growth of this relatively small occupation, some jobs will open up because of the need to replace planners who leave their jobs.

Future growth of the occupation will depend to a great extent on the availability of money for urban planning projects. Growth in Federal support for State and local community development, urban restoration, and land use planning programs should increase requirements for urban planners. Many opportunities for planners should arise in fields in which they have not traditionally been employed, such as environmental and social service planning.

Earnings and Working Conditions

Starting salaries for urban planners ranged between $11,000 and $14,000 a year in 1976. Planners with a master's degree were hired by the Federal Government at $14,097 a year in 1977. In some cases, persons having less than 2 years of graduate work could enter Federal service as interns at yearly salaries of either $9,303 or $11,523.

State governments paid urban planners average beginning salaries of about $11,000 a year in mid-1976, although planners started at more than $14,000 in some States. Salaries of experienced State planners ranged from an average minimum of nearly $16,000 a year to an average maximum of more than $21,000 a year. Salaries of State planning directors ranged from an average minimum of about $24,000 to an average maximum of nearly $28,000 in mid-1976.

City, county, and other local governments paid urban planners average starting salaries exceeding $14,000 in 1976, although some communities in the East and South paid less. In 1976, experienced urban and regional planners generally earned more than one and one-half times as much as the average earnings for all nonsupervisory workers in private industry, except farming.

Most planners have sick leave and vacation benefits and are covered by retirement and health plans. Although most city planners have a scheduled workweek of 40 hours, they sometimes work in the evenings and on weekends to attend meetings with citizens' groups.

Sources of Additional Information

Facts about careers in planning and a list of schools offering training are available from:

American Institute of Planners, 1776 Massachusetts Ave. NW., Washington, D.C. 20036.

American Society of Planning Officials, 1313 East 60th St., Chicago, Ill. 60637.

VETERINARIANS

(D.O.T. 073.081 through .281)

Nature of the Work

Veterinarians (doctors of veterinary medicine) diagnose, treat, and control diseases and injuries among animals. They help prevent the outbreak and spread of animal diseases, many of which can be transmitted to human beings.

Veterinarians treat animals in hospitals and clinics or on farms and ranches. They perform surgery on sick and injured animals and prescribe and administer drugs, medicines, and vaccines.

Veterinary medicine offers a variety of practice specialties. Over one-third of all veterinarians treat small animals or pets exclusively. About another third treat both large and small animals. A large number specialize in the health and breeding of cattle, poultry, sheep, swine, or horses. Many veterinarians inspect meat, poultry, and other foods as part of Federal and State public health programs. Still others teach in veterinary colleges, do research related to animal diseases, foods, and drugs, or work as part of a medical research team to learn about prevention and treatment of human disease.

Places of Employment

There were about 30,500 veterinarians active in 1976—most in private practice. The Federal Government employed about 2,300 veterinarians, chiefly in the U.S. Department of Agriculture and the U.S. Public Health Service. About 750 more were commissioned officers in the veterinary services of the Army and Air Force. Other employers of veterinarians are State and local government agencies, international health agencies, colleges of veterinary medicine, medical schools, research and development laboratories, large livestock farms, animal food companies, and pharmaceutical companies that manufacture drugs for animals.

Veterinarians are located in all parts of the country, and the type of practice generally varies according to geographic setting. Veterinarians in rural areas mainly treat farm animals; those in small towns usually engage in general practice; those in cities and suburban areas often limit their practice to pets.

Training, Other Qualifications, and Advancement

All States and the District of Columbia require veterinarians to have

Over one-third of all veterinarians treat small animals or pets exclusively.

a license. To obtain a license, applicants must have a Doctor of Veterinary Medicine (D.V.M. or V.M.D.) degree from an accredited college of veterinary medicine and pass written and oral State board proficiency examinations. Some States issue licenses without further examination to veterinarians already licensed by another State.

For positions in research and teaching, an additional master's or Ph. D. degree usually is required in a field such as pathology, physiology, or bacteriology.

The D.V.M. or V.M.D. degree requires a minimum of 6 years of college consisting of a 4-year professional degree program, preceded by at least 2 years of preveterinary study that emphasizes the physical and biological sciences. Two veterinary medical colleges require 3 years of preventerinary work, however, and most applicants have completed 3 to 4 years of college before entering the professional programs. In addition to rigorous academic instruction, professional training includes considerable practical experience in diagnosing and treating animal diseases and performing surgery and laboratory work in anatomy, biochemistry, and other scientific and medical subjects.

In 1976, there were 21 colleges of veterinary medicine accredited by the Council on Education of the American Veterinary Medical Association. Admission to these schools is highly competitive. Each year there are many more qualified applicants than the schools can accept. Serious applicants usually need grades of "B" or better, especially in science courses. Experience in part-time or summer jobs working with animals is advantageous. Colleges usually give preference to residents of the State in which the college is located, because these schools are largely State supported. In the South and West, regional educational plans permit cooperating States without veterinary schools to send students to designated regional schools. In other areas, colleges that accept a certain number of students from other States usually give priority to applicants from nearby States that do not have veterinary schools.

Federal funds provide a limited number of loans for needy students who want to pursue full-time study leading to the degree of Doctor of Veterinary Medicine.

Most veterinarians begin as employees or partners in established practices. A few start their own practices with a modest financial investment in drugs, instruments, and an automobile. With a more substantial investment, one may open an animal hospital or purchase an established practice.

Newly qualified veterinarians may enter the Army and Air Force as commissioned officers, or qualify for Federal positions as meat and poultry inspectors, disease-control workers, epidemiologists, research assistants, or commissioned officers in the U.S. Public Health Service. A license is not required for Federal employment.

Employment Outlook

Employment opportunities for veterinarians are expected to be favorable through the mid-1980's. Veterinary employment is expected to grow faster than the average for all occupations during this period, primarily because of growth in the companion animal (horses, dogs, and other pets) population and an increase in veterinary research. Emphasis on scientific methods of raising and breeding livestock and poultry and growth in public health and disease control programs also will contribute to the demand for veterinarians.

Earnings and Working Conditions

Newly graduated veterinarians employed by the Federal Government started at $16,000 a year in 1977. The average annual salary of veterinarians in the Federal Government was $24,300. The incomes of veterinarians in private practice vary considerably, depending on factors such as location, type of practice, and years of experience, but usually are higher than those of other veterinarians, according to the limited data available.

Veterinarians sometimes may be exposed to danger of injury, disease, and infection. Those in private practice often have long and irregular working hours. Veterinarians in rural areas may have to spend much time traveling to and from farms and may have to work outdoors in all kinds of weather. Because they are self-employed, veterinarians in private practice usually can continue working well beyond normal retirement age.

Sources of Additional Information

A pamphlet entitled *Today's Veterinarian* presents additional information on veterinary medicine as a career, as well as a list of colleges of veterinary medicine. A free copy may be obtained by submitting a request, together with a self-addressed stamped business size envelope, to:

American Veterinary Medical Association, 930 N. Meacham Rd., Schaumburg, Ill. 60196.

Information on opportunities for veterinarians in the U.S. Department of Agriculture is available from:

Agricultural Research Service, U.S. Department of Agriculture, Hyattsville, Md. 20782.

Animal and Plant Health Inspection Service, Personnel Division, 12th and Independence Ave. SW., Washington, D.C. 20250.

Agricultural Marketing Service, Personnel Division, 12th and Independence Ave. SW., Washington, D.C. 20250.

Students seeking loan or scholarship assistance should send inquiries to the schools in which they are interested.

WHOLESALE TRADE SALES WORKERS

(D.O.T. 260. through 289.458)

Nature of the Work

Sales workers in wholesale trade play an important role in moving goods from the factory to the consumer. Each sales worker may represent a wholesaler that distributes hundreds of similar products. A wholesale drug company, for example, may stock its warehouse with many brands of drugs, soap, and cosmetics to supply stores that sell directly to the consumer. Likewise, a wholesale building materials distributor sells hardware and construction materials to builders who would otherwise have to deal with many manufacturers.

At regular intervals, sales workers visit buyers for retail, industrial, and commercial firms, as well as buyers for institutions such as schools and hospitals. They show samples, pictures, or catalogs that list the items which their company stocks. Sales workers seldom urge customers to purchase any particular product, since they handle a large number of items. Instead, they offer prompt, dependable service so buyers will become regular customers.

Wholesale sales workers perform many important services for retailers, such as checking the store's stock and ordering items that will be needed before the next visit. Some wholesale sales workers help store personnel improve and update systems for ordering and inventory. In addition, they often advise retailers about advertising, pricing, and arranging window and counter displays. A sales worker who handles specialized products, such as air-conditioning equipment, may give technical assistance on installation and maintenance.

Sales workers do some recordkeeping and attend to other details. They must forward orders to their wholesale houses, prepare reports and expense accounts, plan work schedules, draw up lists of prospects, make appointments, and study literature relating to their products. Some collect money for their companies.

Places of Employment

About 808,000 persons were employed as wholesale sales workers in 1976. Wholesale houses usually are located in cities, but sales workers may be assigned territories in any part of the country. Their territory may cover a small section of a city having many retail stores and industrial users; in less populated regions it may cover half a State or more.

Firms selling machinery and building materials to industrial and business users are leading employers of wholesale sales workers. Other large employers are companies that sell food products. Wholesalers dealing in drugs, dry goods and apparel, motor vehicle equipment, and electrical appliances employ many sales workers as well.

Training, Other Qualifications, and Advancement

The background a sales worker needs depends mainly upon the product line and the market. Selling certain products requires extensive technical training. Drug wholesalers, for example, must know the names and characteristics of the pharmaceutical products they sell. A background in chemistry, biology, or pharmacy would prove useful, if not indispensable. In other product lines, such as food, familiarity with manufacturers and brands becomes much more important than knowledge about the product itself.

Product knowledge is not enough, however, when the sales person has to stimulate demand. Those selling electrical machinery to industrial firms, for example, must have the technical training necessary to discuss their products. But they also must understand how customers operate, what equipment they need, and how they might use their machines in new ways. The greater this understanding, the more machinery they will sell.

Most wholesale sales workers enter their occupation via one of two routes—working up the ladder or transferring in with the appropriate background. High school graduates may begin a career with a wholesale firm in a nonselling job or may be hired as a sales trainee. In either case, beginners usually work in several kinds of nonselling jobs before being assigned to sales. They may start in the stockroom or shipping department to become familiar with the thousands of items the wholesaler carries. Later they may learn the prices of articles and discount rates for goods sold in quantities. Next, they are likely to work on "inside" sales, writing telephone orders. Later, as they accompany an experienced sales worker on calls, trainees come to know some of the firm's customers. The time spent in these initial jobs varies among companies, but usually it take 2 years or longer to prepare trainees for outside selling.

As professionalism grows in wholesale trade and as products become increasingly complex, more and more college graduates enter the sales force directly out of school. Competent sales workers also transfer from manufacturing and retail trade sales positions. Their experience with a particular product line gives them an advantage over the newcomers to the field.

Sales trainees in very large wholesale firms participate in formal training programs that combine classroom instruction with short rotations in various nonselling jobs. Most firms, however, have no formal program. Their trainees learn by observing and trying the different aspects of the work. As they become familiar with customers and procedures, they gradually take on the full responsibility of the job.

Sales workers sometimes can augment their on-the-job training with outside programs. While only a few colleges offer courses relevant to wholesale distribution, the number is expected to increase. Trade associations sponsor training programs to fill this need. Vendors, too, hold sessions, usually to instruct sales people how best to sell a particular product line.

Experienced sales workers who have leadership qualities and sales ability may advance to supervisor, sales manager, or other executive positions.

Employment Outlook

Employment opportunities for sales workers in wholesale trade are expected to be good for those with product knowledge and selling ability. In addition to new positions created by growth, many openings will stem from turnover, which is fairly high in this occupation. A person's success in selling greatly depends on his or her ability to locate new customers and persuade them to buy. A number of new sales workers find they are not suited to the competitive nature of selling and leave the occupation.

The number of wholesale sales workers is expected to grow about as fast as the average for all occupations through the mid-1980's. Businesses and institutions will require a wide variety of products for their own use and for eventual resale. Although many large purchasers and others who require highly specialized products will buy directly from manufacturers, the majority of transactions will involve the wholesale distributor.

As chain stores and other large firms centralize purchasing activities, the value of the sales made to individual customers becomes larger and competition for sales correspondingly greater. Wholesalers can be expected to meet this competition by emphasizing customer services and increasing the size of their sales forces.

Earnings and Working Conditions

According to limited information, most beginning sales workers earned around $9,500 a year in 1976. Experienced sales workers earned considerably more. Since commissions often make up a large proportion of the sales worker's income, earnings vary widely in this occupation. They also depend on the sales worker's experience and seniority, as well as on the product line. Median earnings of the lowest paid sales workers in 1976 varied from $12,000 in automative parts and supplies to $18,400 in paper and paper products distribution. Median earnings of the highest paid sales workers ranged from $20,400 in beverage distribution to over $80,000 in paper and paper products.

Compensation plans differ among firms. Many employers pay a salary plus a percentage commission on sales; others pay a straight commission or straight salary. Some include a bonus. Although most wholesale sales workers have steady, year-round work, sales (and commissions) vary because demand for some products—for example, air-conditioning—is greater during certain seasons. To provide sales workers with a steady income, many companies pay experienced personnel a "draw" against annual commissions. Most companies furnish cars or allowances for cars and reimbursements for certain expenses on the road.

Sales workers often have long, irregular work hours. Although they call on customers during business hours, they may travel at night or on weekends to meet their schedule. However, most sales workers seldom are away from home for more than a few days at a time. They may spend evenings writing reports and orders, may carry heavy catalogs and sample cases, and be on their feet for long periods.

Depending on length of service, most sales workers have a 2- to 4-week paid vacation. Many are covered by company benefits, including health and life insurance and retirement pensions.

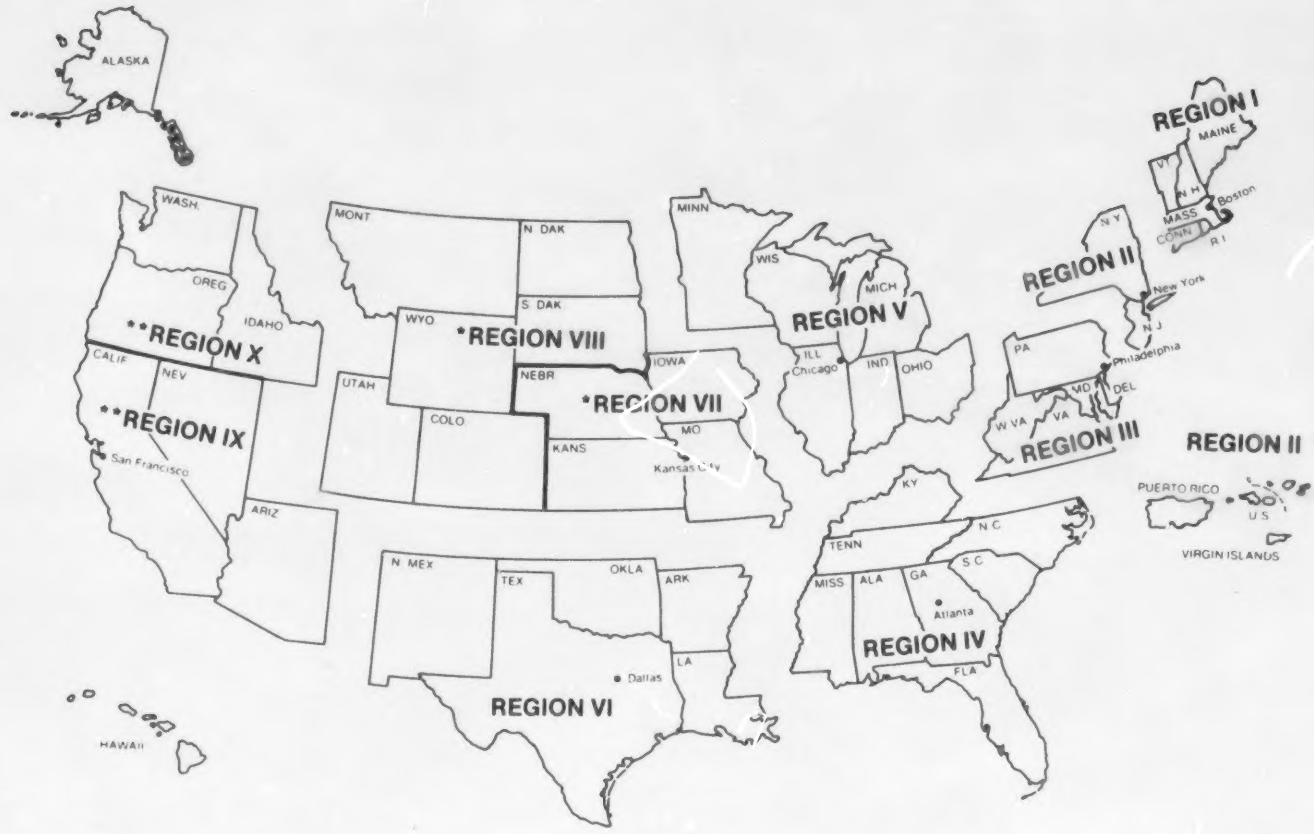
Sources of Additional Information

Information on jobs in wholesale selling may be obtained directly from local wholesale houses or from associations of wholesalers in many of the larger cities. If no local association is available, write to:

National Association of Wholesaler-Distributors, 1725 K St. NW., Washington, D.C. 20006.

Sales and Marketing Executives International, Career Education Division, 380 Lexington Ave., New York, N.Y. 10017.

Bureau of Labor Statistics Regional Offices


ALASKA
WASH
OREG
IDAHO
**REGION X
CALIF
NEV
**REGION IX
San Francisco
ARIZ
HAWAII
MONT
N DAK
S DAK
WYO
*REGION VIII
UTAH
COLO
NEBR
*REGION VII
IOWA
KANS
MO
Kansas City
N MEX
TEX
OKLA
ARK
LA
Dallas
REGION VI
MINN
WIS
MICH
REGION V
ILL
Chicago
IND
OHIO
KY
TENN
N C
S C
MISS
ALA
GA
Atlanta
FLA
REGION IV
PA
W VA
VA
MD
DEL
Philadelphia
REGION III
N Y
New York
N J
REGION II
REGION I
MAINE
VT
N H
MASS
Boston
CONN
R I
REGION II
PUERTO RICO
U S
VIRGIN ISLANDS

Region I
1603 JFK Federal Building
Government Center
Boston, Mass 02203
Phone: (617) 223-6761

Region II
Suite 3400
1515 Broadway
New York, N.Y. 10036
Phone: (212) 399-5405

Region III
3535 Market Street
P.O. Box 13309
Philadelphia, Pa 19101
Phone: (215) 596-1154

Region IV
1371 Peachtree Street, NE.
Atlanta Ga. 30309
Phone: (404) 881-4418

Region V
9th Floor
Federal Office Building
230 S. Dearborn Street
Chicago, Ill. 60604
Phone: (312) 353-1880

Region VI
Second Floor
555 Griffin Square Building
Dallas, Tex. 75202
Phone: (214) 749-3516

Regions VII and VIII*
911 Walnut Street
Kansas City, Mo. 64106
Phone: (816) 374-2481

Regions IX and X**
450 Golden Gate Avenue
Box 36017
San Francisco, Calif. 94102
Phone: (415) 556-4678

*Regions VII and VIII are serviced by Kansas City
**Regions IX and X are serviced by San Francisco